Nevada
Environmental
Restoration
Project

DOE/NV--1256

National Nuclear Security Administration

Supplemental Investigation Plan for FFACO Use Restrictions Nevada Test Site, Nevada

Controlled Copy No.: ___
Revision No.: 0

February 2008

Approved for public release; further dissemination unlimited.

Environmental Restoration
Project

U.S. Department of Energy
National Nuclear Security Administration
Nevada Site Office

Available for sale to the public from:

U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Phone: 800.553.6847
Fax: 703.605.6900
Email: *orders@ntis.gov*
Online ordering: *http://www.ntis.gov/ordering.htm*

Available electronically at *http://www.osti.gov/bridge*

Available for a processing fee to U.S. Department of Energy and its contractors, in paper, from:

U.S. Department of Energy
Office of Scientific and Technical Information
P.O. Box 62
Oak Ridge, TN 37831-0062
Phone: 865.576.8401
Fax: 865.576.5728
Email: *reports@adonis.osti.gov*

DOE/NV--1256

SUPPLEMENTAL INVESTIGATION PLAN FOR FFACO USE RESTRICTIONS NEVADA TEST SITE, NEVADA

U.S. Department of Energy
National Nuclear Security Administration
Nevada Site Office
Las Vegas, Nevada

Controlled Copy No.: ___

Revision No.: 0

February 2008

SUPPLEMENTAL INVESTIGATION PLAN FOR
FFACO USE RESTRICTIONS
NEVADA TEST SITE, NEVADA

Approved by: /s/ Kevin J. Cabble Date: 02/05/2008

Kevin J. Cabble
Federal Sub-Project Director
Industrial Sites Sub-Project

Approved by: /s/ John B. Jones Date: 02/05/2008

John B. Jones
Acting Federal Project Director
Environmental Restoration Project

Table of Contents

List of Figures vi
List of Tables viii
List of Acronyms and Abbreviations x
Executive Summary ES-1

1.0 Introduction 1
1.1 Purpose 8
1.1.1 Modification Process 8
1.1.2 Data Quality Objective Summary 9
1.2 Scope 10
1.3 Use Restriction Investigation Plan Contents 10

2.0 Facility Description 11
2.1 Physical Setting 11
2.2 Operational History 11
2.2.1 Use Restriction 06-25-01, CP-1 Heating Oil Release 11
2.2.2 Use Restriction 06-25-02, UST Release 12
2.2.3 Use Restriction 12-19-01, A12 Fleet Ops Steam Cleaning Efflu 13
2.2.4 Use Restriction 19-09-05, Mud Pit 13
2.2.5 Use Restriction 03-02-004-0360, Underground Storage Tanks 13
2.2.6 Use Restriction 25-25-09, Spill H940825C (from UST 25-3101-1) . . . 14
2.2.7 Use Restriction 25-25-14, Spill H940314E (from UST 25-3102-3) . . . 14
2.2.8 Use Restriction 25-25-15, Spill H941020E (from UST 25-3152-1) . . . 15
2.2.9 Use Restriction 12-25-08, Spill H950524F (from UST 12-B-1) 15
2.2.10 Use Restriction 12-25-10, Spill H950919A (from UST 12-COMM-1) . 15
2.2.11 Use Restriction 02-02-03, UST 2-300-1 16
2.2.12 Use Restriction PRL 454, Weathered Diesel Fuel 16
2.3 Waste Inventory 16
2.4 Current Use Restriction Description 17
2.4.1 Use Restriction 06-25-01, CP-1 Heating Oil Release 17
2.4.2 Use Restriction 06-25-02, UST Release 17
2.4.3 Use Restriction 12-19-01, A12 Fleet Ops Steam Cleaning Efflu 20
2.4.4 Use Restriction 19-09-05, Mud Pit 20
2.4.5 Use Restriction 03-02-004-0360, Underground Storage Tanks 20
2.4.6 Use Restriction 25-25-09, Spill H940825C (from UST 25-3101-1) . . . 23
2.4.7 Use Restriction 25-25-14, Spill H940314E (from UST 25-3102-3) . . . 23
2.4.8 Use Restriction 25-25-15, Spill H941020E (from UST 25-3152-1) . . . 23
2.4.9 Use Restriction 12-25-08, Spill H950524F (from UST 12-B-1) 28
2.4.10 Use Restriction 12-25-10, Spill H950919A (from UST 12-COMM-1) . 28

Table of Contents *(Continued)*

2.4.11 Use Restriction 02-02-03, UST 2-300-1 . . . 28
2.4.12 Use Restriction PRL 454, Weathered Diesel Fuel . . . 28
2.5 Investigative Background . . . 33
2.5.1 Use Restriction 06-25-01, CP-1 Heating Oil Release . . . 33
2.5.2 Use Restriction 06-25-02, UST Release . . . 34
2.5.3 Use Restriction 12-19-01, A12 Fleet Ops Steam Cleaning Efflu . . . 34
2.5.4 Use Restriction 19-09-05, Mud Pit . . . 35
2.5.5 Use Restriction 03-02-004-0360, Underground Storage Tanks . . . 35
2.5.6 Use Restriction 25-25-09, Spill H940825C (from UST 25-3101-1) . . . 37
2.5.7 Use Restriction 25-25-14, Spill H940314E (from UST 25-3102-3) . . . 37
2.5.8 Use Restriction 25-25-15, Spill H941020E (from UST 25-3152-1) . . . 37
2.5.9 Use Restriction 12-25-08, Spill H950524F (from UST 12-B-1) . . . 38
2.5.10 Use Restriction 12-25-10, Spill H950919A (from UST 12-COMM-1) . 38
2.5.11 Use Restriction 02-02-03, UST 2-300-1 . . . 39
2.5.12 Use Restriction PRL 454, Weathered Diesel Fuel . . . 39
2.5.13 National Environmental Policy Act . . . 40

3.0 Objectives . . . 41

3.1 Conceptual Site Model . . . 41
3.1.1 Land-Use and Exposure Scenarios . . . 41
3.1.2 Contaminant Sources and Release Mechanisms . . . 43
3.1.3 Migration Pathways . . . 43
3.1.4 Exposure Points . . . 43
3.1.5 Exposure Routes . . . 43
3.1.6 Additional Information . . . 43
3.2 Contaminants of Potential Concern . . . 44
3.3 Preliminary Action Levels . . . 45
3.4 Data Quality Objective Process Discussion . . . 47

4.0 Field Investigation . . . 50

4.1 Technical Approach . . . 50
4.2 Field Activities . . . 50
4.2.1 Site Preparation Activities . . . 50
4.2.2 Sample Location Selection . . . 51
4.2.3 Sample Collection . . . 52
4.2.4 Sample Management . . . 52
4.3 Safety . . . 52
4.4 Site Restoration . . . 53

5.0 Waste Management . . . 54

5.1 Waste Minimization . . . 54

Table of Contents *(Continued)*

5.2 Potential Waste Streams . . . 55
5.3 Investigation-Derived Waste Management . . . 55
5.3.1 Sanitary Waste . . . 55
5.3.2 Hazardous Waste . . . 57
5.3.3 Hydrocarbon Waste . . . 58
5.4 Management of Specific Waste Streams . . . 58
5.4.1 Personal Protective Equipment . . . 58
5.4.2 Management of Decontamination Rinsate . . . 58

6.0 Quality Assurance/Quality Control . . . 60

6.1 Quality Control Sampling Activities . . . 60
6.2 Laboratory/Analytical Quality Assurance . . . 60
6.2.1 Data Validation . . . 61
6.2.2 Data Quality Indicators . . . 61
6.2.3 Precision . . . 62
6.2.4 Accuracy . . . 63
6.2.5 Representativeness . . . 64
6.2.6 Completeness . . . 64
6.2.7 Comparability . . . 65
6.2.8 Sensitivity . . . 65

7.0 Duration and Records Availability . . . 66

7.1 Duration . . . 66
7.2 Records Availability . . . 66

8.0 References . . . 67

Appendix A - Data Quality Objectives

A.1.0 Introduction . . . A-1

A.1.1 Modification Process . . . A-3

A.2.0 Background Information . . . A-6

A.2.1 Use Restriction 06-25-01, CP-1 Heating Oil Release . . . A-10
A.2.2 Use Restriction 06-25-02, UST Release . . . A-13
A.2.3 Use Restriction 12-19-01, A12 Fleet Ops Steam Cleaning Efflu . . . A-15
A.2.4 Use Restriction 19-09-05, Mud Pit . . . A-18
A.2.5 Use Restriction 03-02-004-0360, Underground Storage Tanks . . . A-21
A.2.6 Use Restriction 25-25-09, Spill H940825C (from UST 25-3101-1) . . . A-23
A.2.7 Use Restriction 25-25-14, Spill H940314E (from UST 25-3102-3) . . . A-26
A.2.8 Use Restriction 25-25-15, Spill H941020E (from UST 25-3152-1) . . . A-26

Table of Contents *(Continued)*

A.2.9 Use Restriction 12-25-08, Spill H950524F (from UST 12-B-1) A-31
A.2.10 Use Restriction 12-25-10, Spill H950919A (from UST 12-COMM-1) A-33
A.2.11 Use Restriction 02-02-03, UST 2-300-1 . . . . . A-35
A.2.12 Use Restriction PRL 454, Weathered Diesel Fuel A-38

A.3.0 Step 1 - State the Problem A-40

A.3.1 Planning Team Members A-40
A.3.2 Conceptual Site Model A-40
A.3.2.1 Contaminant Release A-41
A.3.2.2 Potential Contaminants A-44
A.3.2.3 Migration Pathways, Transport Mechanisms, and Exposure Scenarios A-44

A.4.0 Step 2 - Identify the Goal of the Study A-46

A.4.1 Decision Statement A-46
A.4.2 Alternative Actions to the Decision A-46

A.5.0 Step 3 - Information Needs A-47

A.5.1 Sources of Information A-47
A.5.1.1 Sample Locations A-47
A.5.1.2 Analytical Methods A-48

A.6.0 Step 4 - Define the Boundaries of the Study A-49

A.6.1 Target Populations of Interest A-49
A.6.2 Spatial Boundaries A-49
A.6.3 Practical Constraints A-49
A.6.4 Define the Sampling Units A-50

A.7.0 Step 5 - Develop the Analytic Approach A-51

A.7.1 Population Parameters A-51
A.7.2 Preliminary Action Levels A-51
A.7.2.1 Tier 1 Based FALs A-53
A.7.2.2 Tier 2 Based FALs A-53
A.7.2.3 Tier 3 Based FALs A-53
A.7.3 Decision Rules A-53

A.8.0 Step 6 - Specify Performance or Acceptance Criteria A-54

A.8.1 Decision Hypotheses A-54
A.8.2 False Negative Decision Error A-54
A.8.3 False Positive Decision Error A-56

Table of Contents *(Continued)*

A.9.0 Step 7 - Develop the Plan for Obtaining Data A-57

A.9.1 Judgmental Sampling A-57
A.9.2 Use Restriction 06-25-01, CP-1 Heating Oil Release. A-57
A.9.3 Use Restriction 06-25-02, UST Release A-58
A.9.4 Use Restriction 12-19-01, A12 Fleet Ops Steam Cleaning Efflu. A-59
A.9.5 Use Restriction 19-09-05, Mud Pit A-59
A.9.6 Use Restriction 03-02-004-0360, Underground Storage Tanks A-60
A.9.7 Use Restriction 25-25-09, Spill H940825C A-60
A.9.8 Use Restriction 25-25-14, Spill H940314E A-60
A.9.9 Use Restriction 25-25-15, Spill H941020E A-61
A.9.10 Use Restriction 12-25-08, Spill H950524F A-61
A.9.11 Use Restriction 12-25-10, Spill H950919A (from UST 12-COMM-1) A-61
A.9.12 Use Restriction 02-02-03, UST 2-300-1. . . . . A-62
A.9.13 Use Restriction PRL 454, Weathered Diesel Fuel A-62

A.10.0 References. A-63

Appendix B - Project Organization

B.1.0 Project Organization B-1

Appendix C - Nevada Division of Environmental Protection Comment Responses

List of Figures

Number	Title	Page
1-1	Nevada Test Site Map with UR Locations	4
1-2	Tonopah Test Range Map with UR Locations	5
2-1	Site Sketch of UR 06-25-01, CP-1 Heating Oil Release	18
2-2	Site Sketch of UR 06-25-02, UST Release	19
2-3	Site Sketch of UR 12-19-01, A 12 Fleet Ops Steam Cleaning Efflu.	21
2-4	Site Sketch of UR 19-09-05, Mud Pit	22
2-5	Site Sketch of UR 03-02-004-0360, Underground Storage Tanks	24
2-6	Site Sketch of UR 25-25-09, Spill H940825C (from UST 25-3101-1).	25
2-7	Site Sketch of UR 25-25-14, Spill H940314E (from UST 25-3102-3).	26
2-8	Site Sketch of UR 25-25-15, Spill H941020E (from UST 25-3152-1).	27
2-9	Site Sketch of UR 12-25-08, Spill H950524F (from UST 12-B-1)	29
2-10	Site Sketch of UR 12-25-10, Spill H950919A (from UST 12-COMM-1)	30
2-11	Site Sketch of UR 02-02-03, UST 2-300-1	31
2-12	Site Sketch of UR PRL 454, Weathered Diesel Fuel	32
3-1	Risk-Based Corrective Action Decision Process	46
A.2-1	Use Restriction Location Map on the Nevada Test Site	A-8
A.2-2	Use Restriction Location Map on the Tonopah Test Range	A-9
A.2-3	Site Sketch of UR 06-25-01, CP-1 Heating Oil Release	A-11
A.2-4	Site Sketch of UR 06-25-02, UST Release	A-14

List of Figures *(Continued)*

Number	Title	Page
A.2-5	Site Sketch of UR 12-19-01, A 12 Fleet Ops Steam Cleaning Efflu.	A-16
A.2-6	Site Sketch of UR 19-09-05, Mud Pit	A-19
A.2-7	Site Sketch of UR 03-02-004-0360, Underground Storage Tanks	A-22
A.2-8	Site Sketch of UR 25-25-09, Spill H940825C (from UST 25-3101-1).	A-24
A.2-9	Site Sketch of UR 25-25-14, Spill H940314E (from UST 25-3102-3).	A-27
A.2-10	Site Sketch of UR 25-25-15, Spill H941020E (from UST 25-3152-1).	A-29
A.2-11	Site Sketch of UR 12-25-08, Spill H950524F (from UST 12-B-1)	A-32
A.2-12	Site Sketch of UR 12-25-10, Spill H950919A (from UST 12-COMM-1)	A-34
A.2-13	Site Sketch of UR 02-02-03, UST 2-300-1	A-36
A.2-14	Site Sketch of UR PRL 454, Weathered Diesel Fuel	A-39

List of Tables

Number	Title	Page
1-1	Hazardous Constituents of TPH-DRO	2
1-2	Previous Investigations	6
2-1	Sample Results for the Basis of UR 06-25-01	33
2-2	Sample Results for the Basis of UR 12-19-01	34
2-3	Sample Results for the Basis of UR 19-09-05	36
2-4	Sample Results for the Basis of UR 03-02-004-0360	36
2-5	Sample Results for the Basis of UR 25-25-15	38
2-6	Sample Results for the Basis of UR 12-25-10	39
3-1	Constituents Reported by Analytical Methods	44
3-2	Analytical Requirements for Chemical COPCs	49
5-1	Waste Management Regulations and Requirements	56
6-1	Laboratory and Analytical Performance Criteria for UR Data Quality Indicators	62
7-1	Investigation Activity Durations	66
A.1-1	Hazardous Constituents of TPH-DRO	A-2
A.2-1	Previous Investigations	A-6
A.2-2	Sample Results for CAS 06-25-01	A-12
A.2-3	Sample Results for CAS 06-25-02	A-15
A.2-4	Sample Results for CAS 12-19-01	A-17
A.2-5	Sample Results for CAS 19-09-05	A-20

List of Tables *(Continued)*

Number	Title	Page
A.2-6	Sample Results for CAS 03-02-004-0360	A-23
A.2-7	Sample Results for CAS 25-25-09	A-25
A.2-8	Sample Results for CAS 25-25-14	A-28
A.2-9	Sample Results for CAS 25-25-15	A-30
A.2-10	Sample Results for CAS 12-25-10	A-35
A.2-11	Sample Results for CAS 02-02-03	A-37
A.3-1	Conceptual Site Model Description of Elements for Each UR	A-42
A.3-2	Land-Use and Exposure Scenarios	A-45
A.6-1	Practical Constraints for the UR Field Investigation	A-49

List of Acronyms and Abbreviations

AST	Aboveground storage tank
ASTM	American Society for Testing and Materials
bgs	Below ground surface
BN	Bechtel Nevada
CADD	Corrective Action Decision Document
CAI	Corrective Action Investigation
CAIP	Corrective Action Investigation Plan
CAS	Corrective Action Site
CAU	Corrective Action Unit
CERCLA	*Comprehensive Environmental Resource Conservation and Liability Act*
CFR	*Code of Federal Regulations*
COC	Contaminant of concern
COPC	Contaminant of potential concern
CP	Control Point
CR	Closure Report
CSM	Conceptual site model
DAF	Device Assembly Facility
DoD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DQI	Data quality indicator
DQO	Data quality objective
DRO	Diesel-range organics
EPA	U.S. Environmental Protection Agency

List of Acronyms and Abbreviations *(Continued)*

FAL	Final action level
FFACO	*Federal Facility Agreement and Consent Order*
ft	Foot
ft^2	Square foot
gal	Gallon
HWAA	Hazardous waste accumulation area
ID	Identification
IDW	Investigation-derived waste
in.	Inch
IRIS	Integrated Risk Information System
IS	Industrial Sites
ISMS	Integrated Safety Management System
LCS	Laboratory control sample
MDC	Minimum detectable concentration
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
mi	Mile
MS	Matrix spike
MSD	Matrix spike duplicate
N/A	Not applicable
NAC	*Nevada Administrative Code*
NAD	North American Datum
ND	Normalized difference
ND	Not detected

List of Acronyms and Abbreviations *(Continued)*

NDEP	Nevada Division of Environmental Protection
NEPA	*National Environmental Policy Act*
NNSA/NSO	U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office
NRS	*Nevada Revised Statutes*
NSTec	National Security Technologies, LLC
NTS	Nevada Test Site
NTSWAC	*Nevada Test Site Waste Acceptance Criteria*
PAL	Preliminary action level
PCB	Polychlorinated biphenyl
PID	Photoionization detector
POC	Performance Objective for the Certification of Nonradioactive Hazardous Waste
PPE	Personal protective equipment
PRG	Preliminary remediation goal
QA	Quality assurance
QAPP	Quality Assurance Project Plan
QC	Quality control
RBCA	Risk-based corrective action
RCRA	*Resource Conservation and Recovery Act*
RL	Reporting limit
ROTC	Record of Technical Change
RPD	Relative percent difference
SDWS	Safe Drinking Water Standards
SIP	Supplemental Investigation Plan

List of Acronyms and Abbreviations *(Continued)*

SIR	Supplemental Investigation Report
SNJV	Stoller-Navarro Joint Venture
SSTL	Site-specific target level
SVOC	Semivolatile organic compound
TC	Toxicity characteristic
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total petroleum hydrocarbons
TSCA	*Toxic Substance Control Act*
TTR	Tonopah Test Range
UEH	Unknown extractable hydrocarbons
UR	Use restriction
USAF	U.S. Air Force
UST	Underground storage tank
UTM	Universal Transverse Mercator
VOC	Volatile organic compound
yd^3	Cubic yard
%R	Percent recovery

Executive Summary

Many *Federal Facility Agreement and Consent Order* (FFACO) Use Restrictions (URs) have been established at various corrective action sites (CASs) as part of FFACO corrective actions (FFACO, 1996; as amended January 2007). Since the signing of the FFACO in 1996, practices and procedures relating to the implementation of risk-based corrective action (RBCA) have evolved. This document is part of an effort to re-evaluate all FFACO URs against the current RBCA criteria (referred to in this document as the Industrial Sites [IS] RBCA process) as defined in the *Industrial Sites Project Establishment of Final Action Levels* (NNSA/NSO, 2006a).

After reviewing all of the existing FFACO URs, the 12 URs addressed in this Supplemental Investigation Plan (SIP) could not be evaluated against the current RBCA criteria as sufficient information about the contamination at each site was not available. This document presents the plan for conducting field investigations to obtain the needed information.

This SIP includes URs from Corrective Action Units (CAUs) 326, 339, 358, 452, 454, 464, and 1010, located in Areas 2, 6, 12, 19, 25, and 29 of the Nevada Test Site, which is approximately 65 miles northwest of Las Vegas, Nevada; and CAU 403, located in Area 3 of the Tonopah Test Range, which is approximately 165 miles north of Las Vegas, Nevada. The URs being investigated are listed as follows:

- UR 06-25-01, CP-1 Heating Oil Release
- UR 06-25-02, UST Release
- UR 12-19-01, A12 Fleet Ops Steam Cleaning Efflu.
- UR 19-09-05, Mud Pit
- UR 03-02-004-0360, Underground Storage Tanks
- UR 25-25-09, Spill H940825C (from UST 25-3101-1)
- UR 25-25-14, Spill H940314E (from UST 25-3102-3)
- UR 25-25-15, Spill H941020E (from UST 25-3152-1)
- UR 12-25-08, Spill H950524F (from UST 12-B-1)
- UR 12-25-10, Spill H950919A (from UST 12-COMM-1)
- UR 02-02-03, UST 2-300-1
- UR PRL 454, Weathered Diesel Fuel

The initial corrective action investigations completed for the 12 URs addressed by this document establish that total petroleum hydrocarbons (TPH) are the only contaminant present at each site, and the extent of TPH contamination at each site has been determined. The CASs associated with the

URs addressed in this SIP have been characterized; therefore, supplemental investigations described are limited to collecting information about the potentially hazardous constituents of TPH. Based on results from previous investigations at these sites, each UR is assumed to meet the following criteria:

- The size and depth of the TPH plume has been adequately defined.
- Contaminants other than TPH were not identified as contaminants of concern.
- Areas with the highest TPH contamination are well documented and/or biasing factors exist to ensure sampling is conducted in the areas where maximum concentrations are expected.

The URs will be investigated based on the data quality objectives (DQOs) developed by representatives of the Nevada Division of Environmental Protection (NDEP); U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office; Stoller-Navarro Joint Venture; and National Security Technologies, LLC on December 3, 2007. The DQO process was used to identify and define the type, amount, and quality of data needed to develop and evaluate appropriate corrective actions for the URs. Appendix A provides a detailed discussion of the DQO methodology and the DQOs specific to each UR.

The scope of this SIP includes the following activities:

- Locate the previous sampling locations where remaining TPH contamination (following any remedial activities) was the basis for establishing the current UR.
- Select sample material from previous sampling locations using field-screening methods.
- Submit environmental samples for analysis of volatile organic compounds and semivolatile organic compounds.
- Collect and submit quality control samples.

The underlying assumption for re-evaluation of the URs addressed in this document is that contamination has been identified at these sites and the original conceptual site models are valid. Should the field investigations produce information that contradicts this underlying assumption, NDEP will be notified and an appropriate path forward will be developed.

This SIP will be submitted to NDEP for approval. Fieldwork will be conducted following approval.

1.0 Introduction

This Supplemental Investigation Plan (SIP) contains project-specific information including use restriction (UR) descriptions, environmental sample collection objectives, and criteria for conducting supplemental investigation activities at multiple URs located at the Nevada Test Site (NTS), Nevada and the Tonopah Test Range (TTR), Nevada.

Many *Federal Facility Agreement and Consent Order* (FFACO) URs have been established at various corrective action sites (CASs) as part of FFACO corrective actions (FFACO, 1996; as amended January 2007). Since the signing of the FFACO in 1996, practices and procedures relating to the implementation of risk-based corrective action (RBCA) have evolved. This document is part of an effort to re-evaluate all FFACO URs against the current RBCA criteria (referred to in this document as the Industrial Sites [IS] RBCA process) as defined in the *Industrial Sites Project Establishment of Final Action Levels* (NNSA/NSO, 2006a). Based on this evaluation, the URs were sorted into the following categories:

- Where sufficient information exists to determine that the current UR is consistent with the RCBA criteria.
- Where sufficient information exists to determine that the current UR may be removed or downgraded based on RCBA criteria.
- Where sufficient information does not exist to evaluate the current UR against the RCBA criteria.

After reviewing all the existing FFACO URs, the 12 URs addressed in this SIP could not be evaluated against the current RBCA criteria as sufficient information about the contamination at each site was not available. This document presents the plan for conducting field investigations to obtain the needed information.

This process conforms with *Nevada Administrative Code* (NAC) Section 445A.227 (NAC, 2006b) which lists the requirements for sites with soil contamination. For the evaluation of corrective actions, NAC Section 445A.22705 (NAC, 2006c) requires the use of American Society for Testing and Materials (ASTM) Method E 1739 (ASTM, 1995) to "conduct an evaluation of the site, based on

the risk it poses to public health and the environment, to determine the necessary remediation standards (i.e., final action levels [FALs]) or to establish that corrective action is not necessary."

All FFACO URs are established to protect site workers and the public from inadvertent contact with contaminants of concern (COCs). The COC identified for each UR addressed in this SIP is total petroleum hydrocarbons (TPH). These URs were based exclusively on TPH-diesel-range organics (DRO) and/or TPH-oil contamination exceeding 100 milligrams per kilogram (mg/kg).

Method E 1739-95 stipulates that risk evaluations for TPH contamination be calculated and evaluated based on risk posed by potentially hazardous constituents of TPH. Section 6.4.3 ("Use of Total Petroleum Hydrocarbon Measurements") of ASTM Method E 1739-95 states: "TPHs should not be used for risk assessment because the general measure of TPH provides insufficient information about the amounts of individual chemical(s) of concern present" (see Sections X1.5.4 and X1.42 of Method E 1739-95 in ASTM, 1995). Therefore, the individual potentially hazardous constituents in TPH, as listed in Table 1-1, will be compared to their corresponding action levels to re-evaluate the need for the individual URs.

Table 1-1
Hazardous Constituents of TPH-DRO
(Page 1 of 2)

Common Name	PAL (mg/kg)
1,3,5-Trimethylbenzene	70
2-Methylnaphthalene	190
Anthracene	100,000
Benzo(a)anthracene	2.1
Benzene	1.4
Benzo(a)pyrene	0.21
Benzo(b)fluoranthene	2.1
Benzo(g,h,i)perylene	29,000
Benzo(k)fluoranthene	21
Chrysene	210
Ethylbenzene	400
Fluoranthene	22,000
Fluorene	26,000
Naphthalene	190
n-Butylbenzene	240
n-Propylbenzene	240

Table 1-1
Hazardous Constituents of TPH-DRO
(Page 2 of 2)

Common Name	PAL (mg/kg)
Phenanthrene	100,000
Pyrene	29,000
Toluene	520
Xylenes[a]	420

[a]Combination of o-, m-, and p-xylenes

DRO = Diesel-range organics
mg/kg = Milligrams per kilogram
PAL = Preliminary action level
TPH = Total petroleum hydrocarbons

This investigation includes URs from 11 CASs located in Areas 2, 6, 12, 19, 25, and 29 of the NTS, which is approximately 65 miles (mi) northwest of Las Vegas, Nevada; and one CAS located in Area 3 of the TTR, which is approximately 165 mi north of Las Vegas, Nevada. The locations of the NTS and TTR URs being investigated are shown on Figures 1-1 and 1-2, respectively. The reports documenting previous investigations and corrective action decisions are listed in Table 1-2.

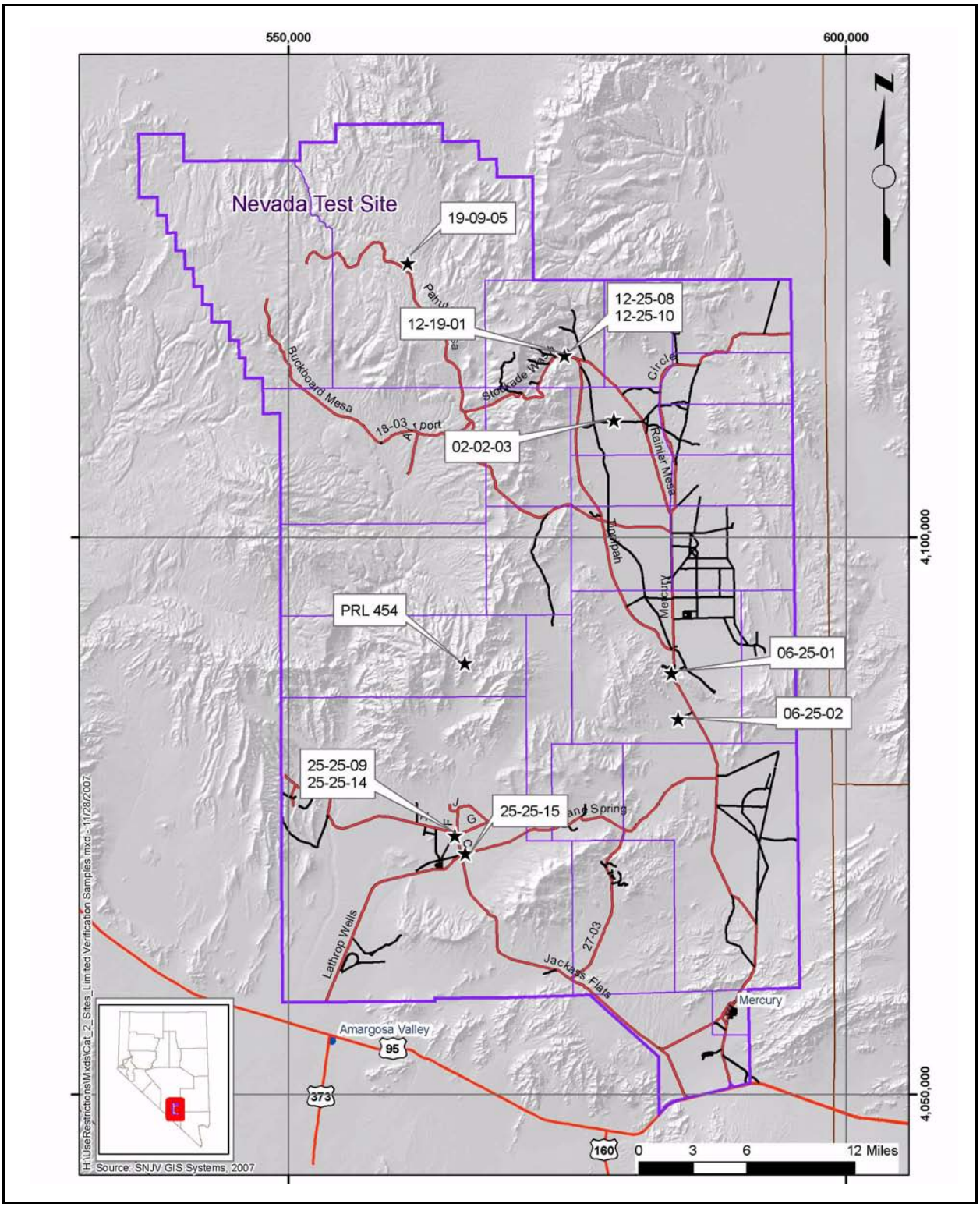

Figure 1-1
Nevada Test Site Map with UR Locations

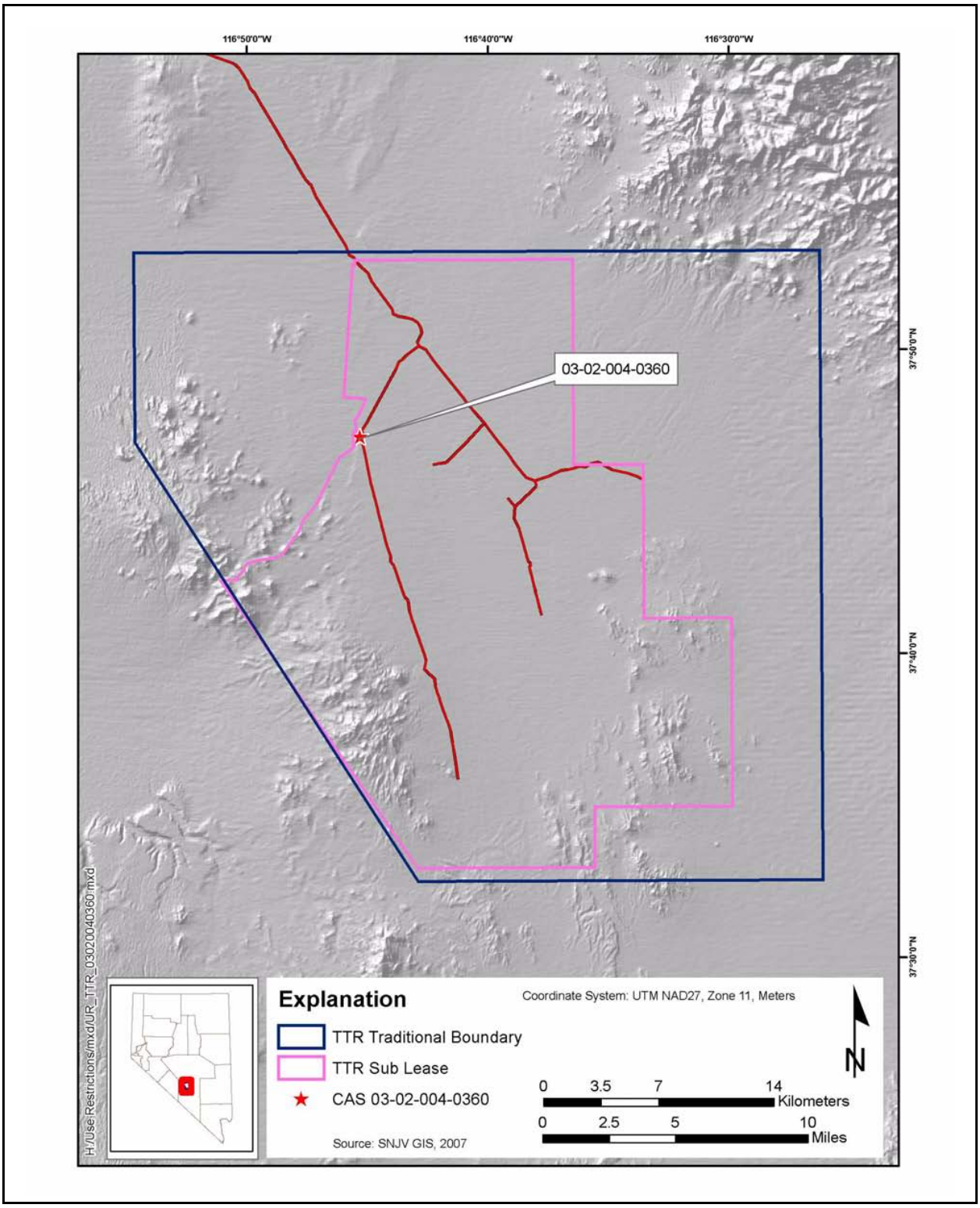

Figure 1-2
Tonopah Test Range Map with UR Locations

Table 1-2
Previous Investigations
(Page 1 of 2)

CAU	UR	Associated Documents
326	06-25-01, CP-1 Heating Oil Release 06-25-02, UST Release	U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office. 2001. *Streamlined Approach for Environmental Restoration Plan for Corrective Action Unit 326: Areas 6 and 27 Release Sites, Nevada,* Rev. 0, DOE/NV--751. September. Las Vegas, NV. U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office. 2002. *Closure Report for Corrective Action Unit 326: Areas 6 and 27 Release Sites, Nevada Test Site, Nevada*, Rev. 1, DOE/NV--859-Rev 1. December. Las Vegas, NV.
339	12-19-01, A12 Fleet Ops Steam Cleaning Efflu.	U.S. Department of Energy, Nevada Operations Office. 1997. *Corrective Action Plan for CAU 339: Area 12 Fleet Operations Steam Cleaning Discharge Area, Nevada Test Site*, Rev. 0, DOE/NV/11718-106. May. Las Vegas, NV. U.S. Department of Energy, Nevada Operations Office. 1997. *Closure Report for CAU 339: Area 12 Fleet Operations Steam-Cleaning Discharge Area, Nevada Test Site*, Rev. 0, DOE/NV/11718-167. December. Las Vegas, NV.
358	19-09-05, Mud Pit	U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office. 2003. *Streamlined Approach for Environmental Restoration Plan for Corrective Action Unit 358: Areas 18, 19, 20 Cellars/Mud Pits, Nevada Test Site, Nevada*, Rev. 1, DOE/NV--837-REV 1. February. Las Vegas, NV. U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office. 2004. *Closure Report for Corrective Action Unit 358: Areas 18, 19, 20 Cellars/Mud Pits, Nevada Test Site, Nevada,* Rev. 0, DOE/NV--944. January. Las Vegas, NV.
403	03-02-004-0360, Underground Storage Tanks	U.S. Department of Energy, Nevada Operations Office. 1996. *Corrective Action Investigation Plan: The Second Gas Station Underground Storage Tanks,* Rev. 0, DOE/NV--426. May. Las Vegas, NV. U.S. Department of Energy, Nevada Operations Office. 1997. *Corrective Action Decision Document, Second Gas Station, Tonopah Test Range, Nevada (Corrective Action Unit No. 403),* Rev. 0, DOE/NV--471. March. Las Vegas, NV. U.S. Department of Energy, Nevada Operations Office. 1998. *Closure Report for Corrective Action Unit 403: Second Gas Station, Tonopah Test Range, Nevada*, Rev. 0, DOE/NV/11718-207. September. Las Vegas, NV.
452	25-25-09, Spill H940825C (from UST 25-3101-1) 25-25-14, Spill H940314E (from UST 25-3102-3) 25-25-15, Spill H941020E (from UST 25-3152-1)	U.S. Department of Energy, Nevada Operations Office. 1997. *SAFER Work Plan for CAUs 452,454,456, and 464, Closure of Historical UST Release Sites Nevada Test Site,* Rev. 0, DOE/NV/11718-133. August. Las Vegas, NV. U.S. Department of Energy, Nevada Operations Office. 1998. *Streamlined Approach for Environmental Restoration Closure Report for Corrective Action Unit 452: Historical Underground Storage Tank Release Sites, Nevada Test Site, Nevada*, Rev. 0, DOE/NV/11718-209. April. Las Vegas, NV.

Table 1-2
Previous Investigations
(Page 2 of 2)

CAU	UR	Associated Documents
454	12-25-08, Spill H950524F (from UST 12-B-1)	U.S. Department of Energy, Nevada Operations Office. 1997. *SAFER Work Plan for CAUs 452,454,456, and 464, Closure of Historical UST Release Sites Nevada Test Site*, Rev. 0, DOE/NV/11718-133. August. Las Vegas, NV.
	12-25-10, Spill H950919A (from UST 12-COMM-1)	U.S. Department of Energy, Nevada Operations Office. 1998. *Streamlined Approach for Environmental Restoration Closure Report for Corrective Action Unit 454: Historical Underground Storage Tank Release Sites, Nevada Test Site, Nevada*, Rev. 0, DOE/NV/11718-211. April. Las Vegas, NV.
464	02-02-03, UST 2-300-1	U.S. Department of Energy, Nevada Operations Office. 1997. *SAFER Work Plan for CAUs 452,454,456, and 464, Closure of Historical UST Release Sites Nevada Test Site,* Rev. 0, DOE/NV/11718-133. August. Las Vegas, NV. U.S. Department of Energy, Nevada Operations Office. 1998. *Streamlined Approach for Environmental Restoration Closure Report for Corrective Action Unit 464: Historical Underground Storage Tank Release Sites, Nevada Test Site, Nevada,* Rev. 0, DOE/NV/11718-212. April. Las Vegas, NV.
1010	PRL 454, Weathered Diesel Fuel	Lockheed Martin Energy Systems, Inc. 1998. *Environmental Compliance Program, Final UST Remedial Action Report: Phase 2 Offbase Excavate and Remove Sites. Hazardous Waste Remedial Actions Program.* Prepared for the U.S. Department of Energy, Contract DE-AC05-84OR21400. July. Edwards Air Force Base, CA.

CAU = Corrective Action Unit
SAFER = Streamlined Approach to Environmental Restoration
UR = Use restriction
UST = Underground storage tank

The initial corrective action investigations (CAIs) for the 12 URs addressed in this SIP have been completed and establish that TPH is the only contaminant present at each site, at levels of potential concern; and the extent of TPH contamination at each site has been determined to define the extent of each UR. The CASs associated with the URs addressed in this SIP have been characterized; therefore, supplemental investigations described are limited to collecting information about the potentially hazardous constituents of TPH, from the areas previously defined, as containing the highest concentration of TPH. Based on results from previous investigations at these sites, each UR is assumed to meet the following criteria:

- The size and depth of the TPH plume has been adequately defined.
- Contaminants other than TPH were not identified as COCs.

- Areas with the highest TPH contamination are well documented and/or biasing factors exist to ensure sampling is conducted in the areas where maximum concentrations are expected.

1.1 Purpose

This document presents the plan for re-evaluating existing URs, through collection of additional samples to generate required data, for evaluation of the UR against the current IS RBCA process, and to potentially modify existing URs for consistency with the RBCA process. This evaluation will result in one of the following decisions for each UR:

1. No action. The risk posed by site contamination is controlled appropriately by the current UR.

2. Removal of the current UR. Contamination above FALs is not present at the site.

3. Modification of the current UR to appropriately control risks posed by the site (e.g., Administrative UR).

1.1.1 Modification Process

All FFACO URs were established in an approved FFACO closure document (e.g., Corrective Action Decision Document [CADD]/Closure Report [CR] or CR).

Changes to approved FFACO documents may take the form of an addendum, an errata sheet, or a Record of Technical Change (ROTC). Addenda are used when extensive corrections/additions to a section or multiple sections of an FFACO document are necessary.

Approval of the subsequent UR Supplemental Investigation Report (SIR) (similiar to a CADD/CR) will constitute approval of the UR modifications recommended for each UR. Following approval of the UR SIR, an addendum to each associated closure document (that originally established each UR) will be prepared and submitted as U.S. Department of Energy (DOE), National Nuclear Security Administration Nevada Site Office (NNSA/NSO) FFACO records. These addenda will consist of:

- A cover page that will refer the reader to the UR SIR for additional information.
- The cover and signature pages of the UR SIR.
- The Nevada Division of Environmental Protection (NDEP) approval letter of the UR SIR.
- The corresponding section of the UR SIR.

As applicable, requirements for inspecting and maintaining the modified URs will be lifted, and the postings and signage at each site, specific to the FFACO UR, will be removed. Fencing and posting may be present for radiological purposes at these sites and are unrelated to the FFACO UR, such as those required by the *NV/YMP Radiological Control Manual* (NNSA/NSO, 2004a). Modification of any UR will not affect or modify non-FFACO requirements for fencing, posting, or monitoring at any site.

1.1.2 Data Quality Objective Summary

The sites will be investigated based on data quality objectives (DQOs) developed by representatives of NDEP; NNSA/NSO; Stoller-Navarro Joint Venture (SNJV); and National Security Technologies, LLC (NSTec). The DQOs are used to identify and define the type, amount, and quality of data needed to develop and evaluate appropriate corrective actions for the URs. This SIP describes the investigative approach developed to collect the data needs identified in the DQO process. While a detailed discussion of the DQO methodology and the DQOs specific to each UR are presented in Appendix A of this document, a summary of the DQO process is provided below.

The DQO problem statement is: "Existing information on the nature of TPH contamination is insufficient to realign historical URs with current risk-based decision methodology." To address this question, resolution of the following decision statement is required:

- "Are any potentially hazardous constituents of TPH present above FALs in environmental media within the current UR?"

Any analytical result for a contaminant of potential concern (COPC) above the FAL will result in that COPC being designated a COC. A COC may also be defined as a contaminant that, in combination with other like contaminants, is determined to jointly pose an unacceptable risk based on a multiple constituent analysis (NNSA/NSO, 2006a).

The informational inputs and data needs to resolve the problem statement and the decision statement will be generated for each UR by collecting and analyzing samples generated during a field investigation. The presence of potentially hazardous constituents of TPH above FALs at each UR will be determined by collecting samples from areas with the highest concentration of TPH and

analyzing those samples using the volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) analytical methods.

1.2 Scope

To generate information needed to resolve the decision statement identified in the DQO process, the scope of the supplemental investigation for each UR includes the following activities:

- Locate the previous sampling locations where remaining TPH contamination (following any remedial activities) was the basis for establishing the current UR.
- Select sample material from previous sampling locations using field-screening methods for analysis.
- Submit environmental samples for VOC and SVOC analyses.
- Collect and submit quality control (QC) samples.

The underlying assumption for the re-evaluation of URs addressed in this document is that contamination at these sites have been identified and the original conceptual site models (CSMs) are valid. Should the field investigations produce information that contradicts this underlying assumption, NDEP will be notified and an appropriate path forward will be developed.

1.3 Use Restriction Investigation Plan Contents

Section 1.0 presents the purpose and scope of this SIP, and Section 2.0 provides background information about URs included in this investigation. Objectives of the investigation, including CSMs, are presented in Section 3.0. Field investigation and sampling activities are discussed in Section 4.0, and waste management issues are discussed in Section 5.0. General field and laboratory quality assurance (QA) (including QA sample collection) are presented in Section 6.0 and also the *Industrial Sites Quality Assurance Project Plan* (QAPP) (NNSA/NV, 2002b). The project schedule and records availability are discussed in Section 7.0, and Section 8.0 provides a list of references. Appendix A is a detailed discussion of the DQOs specific to each UR, and Appendix B contains information on the project organization.

2.0 Facility Description

This SIP is comprised of 12 URs selected for the potential to modify or remove the UR based on the nature of the TPH release identified at each UR. The URs are located at various geographical areas within the NTS and TTR.

2.1 Physical Setting

The general physical settings of Areas 2, 6, 12, 19, 25, and 29 of the NTS, and Area 3 of the TTR, have been characterized in previous UR investigations and documented in corresponding closure documents (e.g., CADD and CR) (see Table 1-2). General background information pertaining to topography, geology, hydrogeology, and climatology is provided for these specific areas of the NTS region in the *Geologic Map of the Nevada Test Site, Southern Nevada* (USGS, 1990); *Comprehensive Environmental Resource Conservation and Liability Act (CERCLA) Preliminary Assessment of DOE's Nevada Operations Office Nuclear Weapons Testing Areas* (DRI, 1988); *Final Environmental Impact Statement, Nevada Test Site, Nye County, Nevada* (ERDA, 1977); and the *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* (DOE/NV, 1996b).

2.2 Operational History

The following subsections provide an operational history description pertinent to each current UR. Each UR-specific summary is designed to describe the UR and illustrate all significant, known activities.

2.2.1 Use Restriction 06-25-01, CP-1 Heating Oil Release

Corrective Action Site 06-25-01 consists of a surface and subsurface heating oil release identified at Building CP-1 in Area 6 of the NTS. The release was associated with a rupture that occurred in a pressurized underground pipe that carried heating oil (diesel) from an underground heating oil tank (Tank 6-CP-1), located west of Building CP-70, to a boiler in Building CP-1 within the Area 6 Control Point (CP) compound. The rupture occurred near the midpoint of the approximately 400-foot [ft]-long-pipe. The CP-1 Heating Oil Release was discovered on October 31, 1991, when fuel was

observed to be discharging in a "geyser-like" manner from the buried pipe within the CP parking lot. Repairs to the pipe were attempted; however, the pipe did not maintain pressure in a pressure test. The pipeline was not used again and the underground tank was replaced by an aboveground tank located next to the CP-1 boiler. The total quantity of fuel released was not determined, the amount released to the surface was estimated to be 10 gallons (gal). The surface release was contained and remediated, but the subsurface release was not remediated (NNSA/NV, 2001).

In October 1998, Tank 6-CP-1 was closed in place by removing the contents, cleaning the tank, and backfilling it with cement. Impacted soil was present around the tank and was issued release number 981201-3196 by the Nevada Division of Emergency Management (NNSA/NV, 2001). Impacted soil around the tank was administratively closed in place and NDEP approved the closure activities. The piping associated with this tank was not closed at that time, because the piping was identified to be closed as part of CAS 06-25-01. The CAS was subject to corrective actions that resulted in the implementation of a UR (NNSA/NV, 2001).

2.2.2 Use Restriction 06-25-02, UST Release

Corrective Action Site 06-25-02 consists of a surface petroleum hydrocarbon release that resulted from overfilling a heating oil tank located west of Building 500 at the Device Assembly Facility (DAF) in Area 6 of the NTS. Tank 6-DAF-5 is a 10,000-gal heating oil tank that is currently active. On March 17, 1993, approximately 30 gal of diesel fuel were reported to have been released to the surrounding soil when the tank was overfilled. Personnel who responded to the release indicated in field notes that the fuel overflowed the fill port, and the box surrounding the fill port, and poured onto the concrete and surrounding soil. At the time of the release, the fill port had no spill or overfill protective device installed. The box around the fill port, therefore, provided a direct conduit for fuel to enter the gravel tank backfill and overflow outside onto the surrounding surface soil (NNSA/NV, 2001).

On March 19, 1993, approximately 2.2 cubic yards (yd^3) of impacted soil was excavated and containerized. Field notes indicate that soil and gravel were excavated to a depth of 1 to 2 ft around the fill port. In March 1995, soil and gravel from around the fill port were excavated to allow installation of spill and overfill equipment. This likely would have required excavation to the top of the tank around the fill port. Based on process knowledge, approximately 6 yd^3 of soil was excavated

and disposed of as hydrocarbon-impacted material. Whether all of the impacted soil was removed at that time is unknown, and the release was included in CAS 06-25-02. The CAS was subject to corrective actions that resulted in the implementation of a UR at the site (NNSA/NV, 2001).

2.2.3 Use Restriction 12-19-01, A12 Fleet Ops Steam Cleaning Efflu.

Corrective Action Site 12-19-01 consists of a surface discharge from a sand/oil interceptor located at the former Area 12 Fleet Operations Building 12-16. The Area 12 Fleet Operations site is located in the southeast portion of the Area 12 Camp at the NTS. In approximately 1965, the former Area 12 Fleet Operations Building 12-16 was constructed and functioned up to January 1993 as a maintenance facility for light- and heavy-duty vehicles. A sand/oil interceptor, which segregated the materials generated from the steam cleaning activities, discharged effluent to the surface approximately 340 ft east. As a result of the discharges, elevated concentrations of TPH were present in soils at the site, and the release was included in CAS 12-19-01. As part of CAS 12-19-01 corrective action, approximately 80 yd^3 of hydrocarbon-impacted soils were excavated and a UR was implemented for remaining TPH-impacted soil (DOE/NV, 1997a and c).

2.2.4 Use Restriction 19-09-05, Mud Pit

Corrective Action Site 19-09-05 consists of TPH-contaminated drilling muds in a mud pit located in Area 19 of the NTS. The mud pit measures 97 by 81 ft, with a maximum 1-ft depth of drilling mud. Mud pits at the NTS were used to transfer and collect drilling mud and other drilling fluids. The mud pit present at CAS 19-09-05 contains light gray drilling mud that is dried and cracked. Diesel fuel was commonly used as a drilling lubricant, and elevated levels of TPH have been detected at the site. The CAS was subject to corrective actions that resulted in the implementation of a UR (NNSA/NSO, 2003).

2.2.5 Use Restriction 03-02-004-0360, Underground Storage Tanks

Corrective Action Site 03-02-004-0360 consists of subsurface petroleum hydrocarbon releases from two underground storage tanks (USTs) formerly located at the Second Gas Station in Area 3 of the TTR. The Second Gas Station was in use from approximately 1965 to 1980. The USTs were located approximately 36 ft east of the Old Light Duty Shop, Building 0360, and consisted of one gasoline UST and one diesel UST. The two USTs and associated dispensary stations were removed sometime

between August 8, 1982, and June 13, 1987. The diesel UST has a 4,000-gal capacity and during removal a breach was observed below the top of the tank. It was unknown whether the breach was caused during removal activities, or pre-existed, and soil around the tank appeared visibly contaminated. It was unknown whether contaminated soil surrounding the tanks was removed during tank excavation activities, so the site was included in CAS 03-02-004-0360. The CAS was subject to corrective actions that resulted in the implementation of a UR (DOE/NV, 1996a).

2.2.6 Use Restriction 25-25-09, Spill H940825C (from UST 25-3101-1)

Corrective Action Site 25-25-09 consists of a subsurface petroleum hydrocarbon release identified at UST 25-3101-1 located at Building 3101 in Area 25 of the NTS. Underground storage tank 25-3101-1 was located on the south side of Building 25-3101 within the Area 25 CP Facility. The tank had an approximate 4,000-gal capacity and was used to store diesel fuel. On July 20, 1994, the tank was removed, and closure of the UST (CAS 25-02-13) was accepted by NDEP in 1995. Due to practical constraints at the site, soils surrounding the tank were not excavated and hydrocarbon releases to these soils were included in CAS 25-25-09 (DOE/NV, 1998c). This CAS was subject to corrective action that included sampling to define the extent of the release, and resulted in the implementation of a UR (DOE/NV, 1998c).

2.2.7 Use Restriction 25-25-14, Spill H940314E (from UST 25-3102-3)

Corrective Action Site 25-25-14 consists of a subsurface petroleum hydrocarbon release identified at UST 25-3102-3 located at Building 3102 in Area 25 of the NTS. Underground storage tank 25-3102-3 was located on the southwest corner of Building 25-3102 within the Area 25 CP Facility. The tank had an approximate 560-gal capacity and was used to store waste oil. The tank contents were characterized as hazardous and subsequently removed and treated following appropriate state and federal regulations. On March 9, 1994, the tank was removed and closure of the UST (CAS 25-02-18) was accepted by NDEP in 1994. Additional excavation was conducted at the site in May of 1995, but samples taken from the tank excavation had elevated levels of TPH, and additional excavation was not possible due to practical constraints. Hydrocarbon releases associated with the tank were included in CAS 25-25-14. The CAS was subject to corrective actions, that included sampling to define the extent of the release, and resulted in the implementation of a UR (DOE/NV, 1998c).

2.2.8 Use Restriction 25-25-15, Spill H941020E (from UST 25-3152-1)

Corrective Action Site 25-25-15 consists of a subsurface petroleum hydrocarbon release identified at UST 25-3152-1 located at Building 3152 in Area 25 of the NTS. Underground storage tank 25-3152-1 was located on the west side of the former Radiological Safety Building 25-3152 of the NTS. The tank had an approximate 1,000-gal capacity and supplied fuel oil for a boiler. On August 24, 1994, the tank was removed and closure of the UST (CAS 25-02-19) was accepted by NDEP in 1995. Additional excavation was conducted at the site in May of 1995, but samples taken from the tank excavation had elevated levels of TPH, and additional excavation was not possible due to practical constraints. Hydrocarbon releases associated with the tank were included in CAS 25-25-15. The CAS was subject to corrective actions, that included sampling to define the extent of the release, and resulted in the implementation of a UR (DOE/NV, 1998c).

2.2.9 Use Restriction 12-25-08, Spill H950524F (from UST 12-B-1)

Corrective Action Site 12-25-08 consists of a subsurface petroleum hydrocarbon release from UST 12-B-1 located at the "B" Tunnel in Area 12 of the NTS. Underground storage tank 12-B-1 was located east of the main portal entrance to "B" Tunnel. The tank had an approximate of 500-gal capacity and contained approximately 400 gal of diesel fuel at the time of identification. The tank was situated on a hillside slope and was partially exposed at the surface. On March 1, 1995, the tank was removed and hydrocarbon releases associated with the tank were included in CAS 12-25-08. The CAS was subject to corrective actions that resulted in the implementation of a UR (DOE/NV, 1998d).

2.2.10 Use Restriction 12-25-10, Spill H950919A (from UST 12-COMM-1)

Corrective Action Site 12-25-10 consists of a subsurface petroleum hydrocarbon release from UST 12-COMM-1 located at the former Communications/Power Maintenance Shop in Area 12 of the NTS. Underground storage tank 12-COMM-1 was located north of a former communications building and was approximately 50 percent exposed at the time of identification. The tank had an approximate 500-gal capacity and was used to store waste oil hydrocarbons. On August 7, 1995, the tank and associated hydrocarbon releases were included in CAS 12-25-10. The tank was removed and during removal and excavation of surrounding soils, a lens of gray material was discovered and attributed to an earlier release. Additional excavation was completed on December 19, 1997, and

afterwards, the gray lens material remained visible. This resulted in the implementation of a UR (DOE/NV, 1998d).

2.2.11 Use Restriction 02-02-03, UST 2-300-1

Corrective Action Site 02-02-03 consists of a subsurface petroleum hydrocarbon release from UST 2-300-1 located at Bunker 300 in Area 2 of the NTS. Underground storage tank 2-300-1 was located on the east side of Area 2 Bunker 300. The tank had an approximate 500-gal capacity and supplied diesel fuel for generators. On April 30, 1996, the tank was removed. In 1996, excavation activities indicated that a spill had impacted soil under the generator room and access driveway. It is believed that the release was a result of historical and periodic product line leakage, because the tank was full at the time of initial field identification. No soil staining was observed above or directly below the tank at the time of closure, and no apparent holes or rust were observed on the tank. The hydrocarbon spill was included in CAS 02-02-03 and corrective actions at the CAS resulted in the implementation of a UR (DOE/NV, 1998e).

2.2.12 Use Restriction PRL 454, Weathered Diesel Fuel

Corrective Action Site PRL 454 consists of a surface hydrocarbon release identified surrounding concrete pads that had previously supported two diesel generators at the former Microwave Relay Annex located on Shoshone Peak in Area 29 of the NTS. In 1994, the site was partially dismantled and the aboveground storage tanks (ASTs) that supported the generators were removed. Currently, a 2,100-gal fuel tank, antenna tower, and U.S. Geological Society equipment shed are present. Hydrocarbon spills associated with the generators were included in CAS PRL 454. The CAS was subsequently subject to corrective actions that resulted in the implementation of a UR (Lockheed Martin Energy Systems, Inc., 1998).

2.3 Waste Inventory

Each UR included in this SIP contains releases of TPH that have been investigated and documented in previous investigation and closure documents (see Table 1-2). The TPH contamination has been identified as the only COC present at these sites, and the extent of contamination has been defined.

2.4 Current Use Restriction Description

The following subsections contain UR descriptions currently established at the sites included in this supplemental investigation.

2.4.1 Use Restriction 06-25-01, CP-1 Heating Oil Release

A UR is in place at the site due to TPH contamination. The UR, as recorded in the FFACO, states the future use of any land related to this CAU, as described by surveyed location, is restricted from any DOE or Air Force activity that may alter or modify the containment control as identified by the state and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance. Advance approval must be obtained from NNSA/NSO IS before subsurface activities at these locations, including routine maintenance, repair, or other activities. Use restrictions were implemented at three locations for this CAS around the original pipeline break in the Area 6 CP bus parking lot, at a segment of pipeline adjacent Building CP-1 and extending east over a utility corridor, and around an exposed broken pipeline located between the Area 6 CP access road and the south edge of the bus parking lot. There are no monitoring requirements associated with the UR (NNSA/NV, 2002a). Figure 2-1 shows a sketch of the UR.

2.4.2 Use Restriction 06-25-02, UST Release

A UR is in place at the site due to TPH contamination. The UR, as recorded in the FFACO, states the future use of any land related to this CAU, as described by surveyed location, is restricted from any DOE or Air Force activity that may alter or modify the containment control as identified by the state and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance. Advance approval must be obtained from NNSA/NSO IS before subsurface activities at these locations, including routine maintenance, repair, or other activities. The UR is for the area around the fill port. There are no monitoring requirements associated with the UR (NNSA/NV, 2002a). Figure 2-2 shows a sketch of the UR.

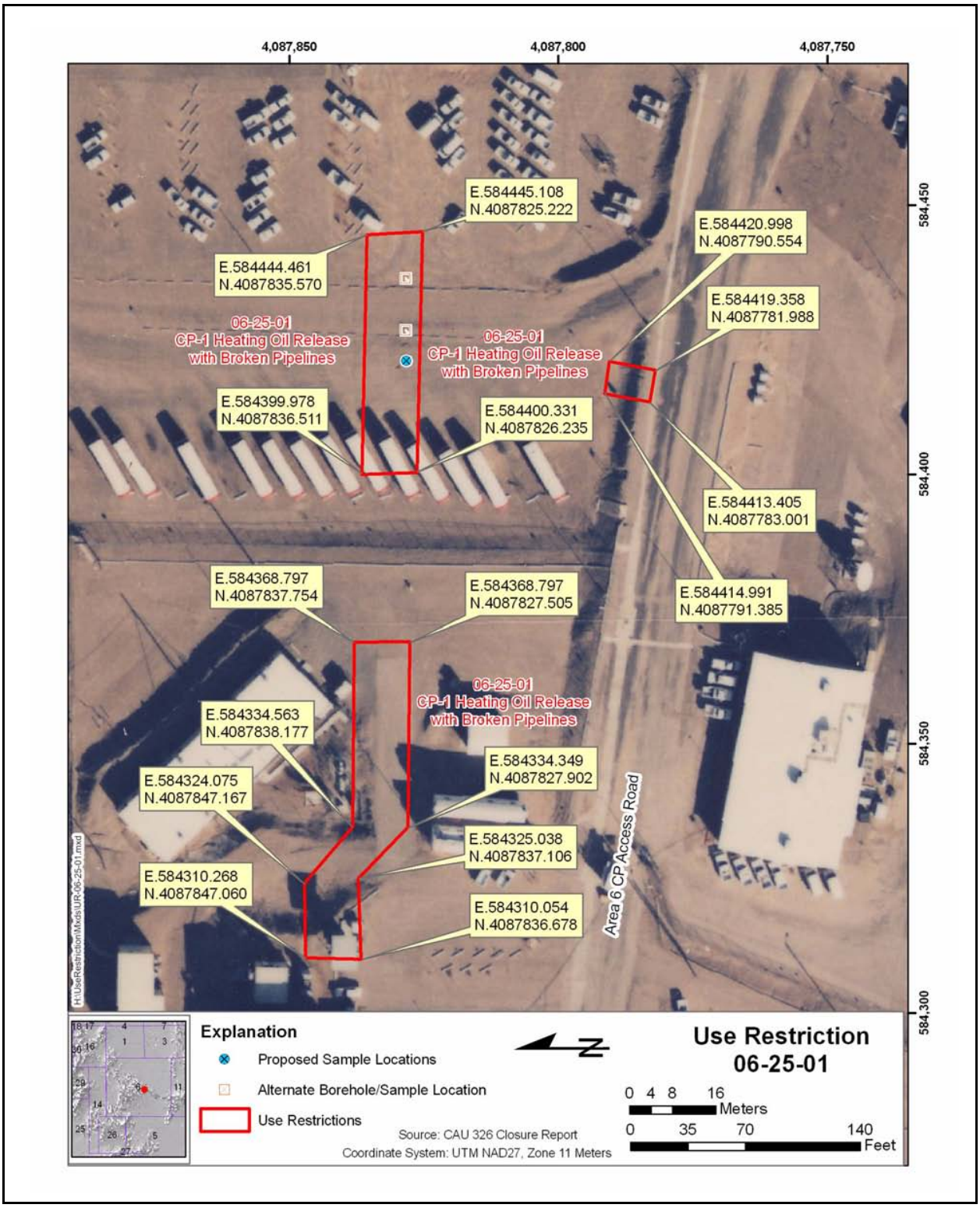

Figure 2-1
Site Sketch of UR 06-25-01, CP-1 Heating Oil Release

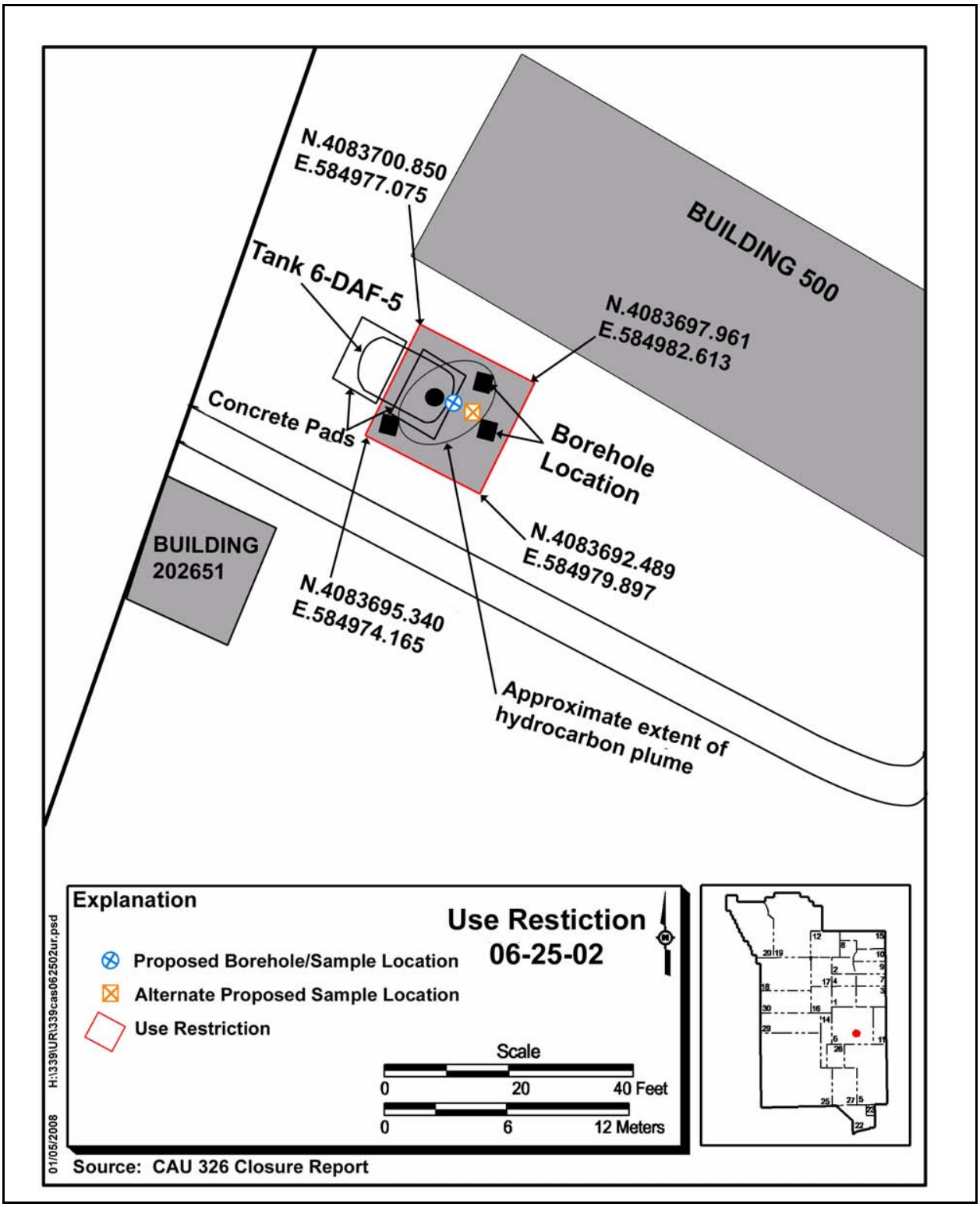

Figure 2-2
Site Sketch of UR 06-25-02, UST Release

2.4.3 Use Restriction 12-19-01, A12 Fleet Ops Steam Cleaning Efflu.

A UR is in place at the site due to TPH contamination. As described in the FFACO, the UR states the future use of any land related to this CAU, as described by surveyed location, is restricted from activity that may alter or modify the containment control, identified by the state and in the CAU CR, or other CAU documentation, unless appropriate concurrence is obtained in advance. The UR area includes the initially impacted area and a wash area. In 2004, post-closure sampling requirements initially associated with the UR were removed; the perimeter was fenced and signs posted; and annual monitoring was implemented to verify the signs are in place and legible (Maize, 2004). Figure 2-3 shows a sketch of the UR.

2.4.4 Use Restriction 19-09-05, Mud Pit

A UR is in place at the site due to TPH contamination. The UR, as recorded in the FFACO, states the future use of any land related to this CAU, as described by surveyed location, is restricted from any DOE or Air Force activity that may alter or modify the containment control as identified by the state and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance. T-posts mark the corner of the active UR 19-09-05. There are no monitoring requirements associated with the UR (NNSA/NSO, 2004b). Figure 2-4 shows a sketch of the UR.

2.4.5 Use Restriction 03-02-004-0360, Underground Storage Tanks

A UR is in place at the site due to TPH contamination. The UR, as recorded in the FFACO, states the future use of any land related to this CAU, as described by surveyed location, is restricted from any DOE or Air Force activity that may alter or modify the containment control as identified by the state and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance. The Restricted Excavation Area begins at the eastern wall of Building 0360 and extends eastward 45 ft east. Surface disturbances may be required for maintenance and repair purposes in the Restricted Excavation Area because subsurface utilities are present. In these cases, approval for excavation or surface disturbance will be provided by the Sandia National Laboratories Health and Safety Officer, or designee. The Sandia National Laboratories Health and Safety Officer, or designee, will inform DOE in writing (within three weeks of the surface disturbance) of the purpose, time, and extent of the surface disturbance; surface restoration activities/modifications; and

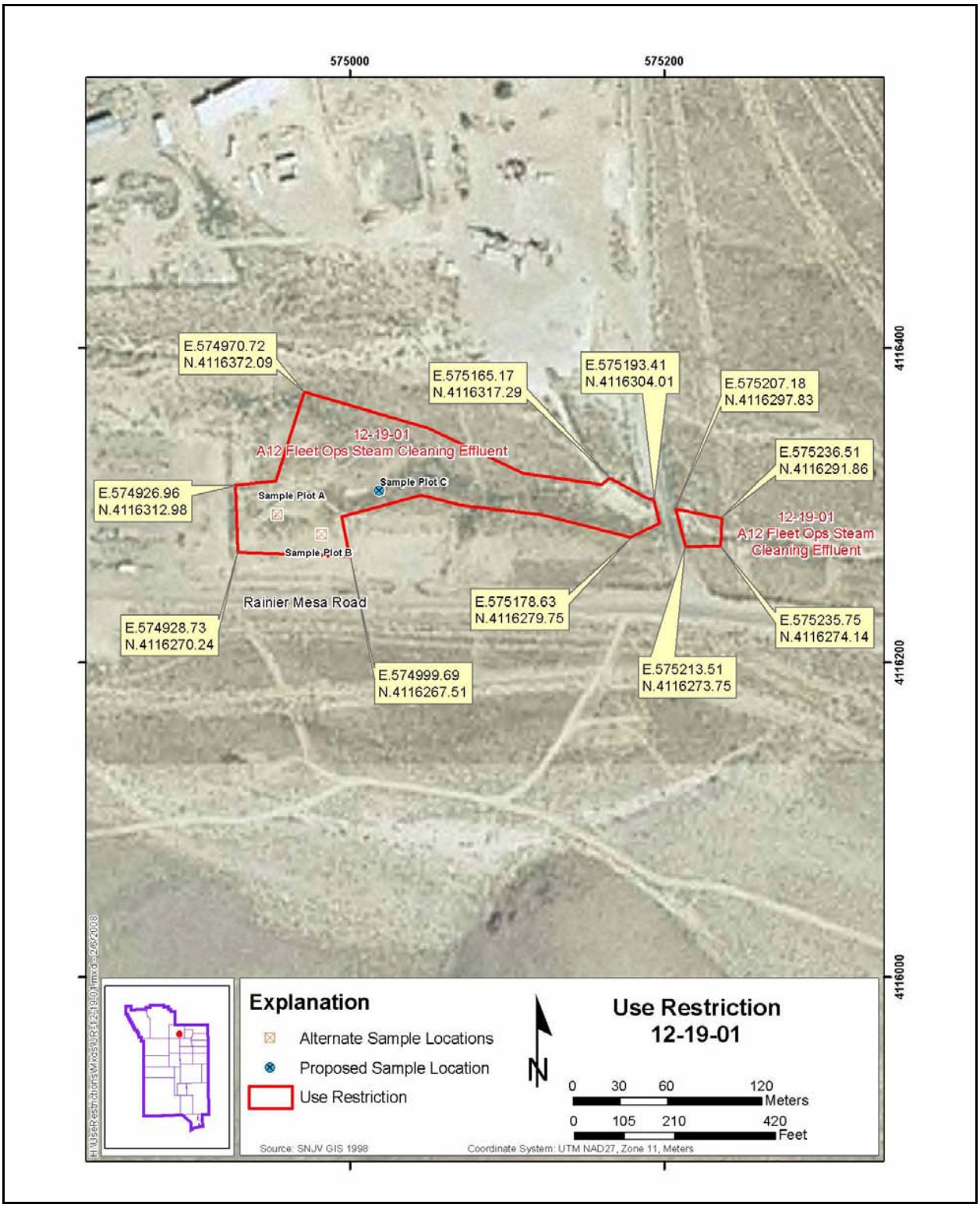

Figure 2-3
Site Sketch of UR 12-19-01, A 12 Fleet Ops Steam Cleaning Efflu.

Figure 2-4
Site Sketch of UR 19-09-05, Mud Pit

disposition of the excavated materials. Signs were posted identifying the site and restricting surface disturbances. There are no monitoring requirements associated with the UR (DOE/NV, 1998a). Figure 2-5 shows a sketch of the UR.

2.4.6 Use Restriction 25-25-09, Spill H940825C (from UST 25-3101-1)

A UR is in place at the site due to TPH contamination. The UR, as described in the FFACO, states the future use of any land related to this CAU, as described by surveyed location, is restricted from any activity that may alter or modify the containment control as identified by the state and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance. Monitoring requirements have not been identified for the site. Figure 2-6 shows a sketch of the UR.

2.4.7 Use Restriction 25-25-14, Spill H940314E (from UST 25-3102-3)

A UR is in place at the site due to TPH contamination. The UR, as described in the FFACO, states the future use of any land related to this CAU, as described by surveyed location, is restricted from any activity that may alter or modify the containment control as identified by the state and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance. Monitoring requirements have not been identified for the site. Figure 2-7 shows a sketch of the UR.

2.4.8 Use Restriction 25-25-15, Spill H941020E (from UST 25-3152-1)

A UR is in place at the site due to TPH contamination. The UR, as described in the FFACO, states the future use of any land related to this CAU, as described by surveyed location, is restricted from any activity that may alter or modify the containment control as identified by the state and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance. Monitoring requirements have not been identified for the site. Figure 2-8 shows a sketch of the UR.

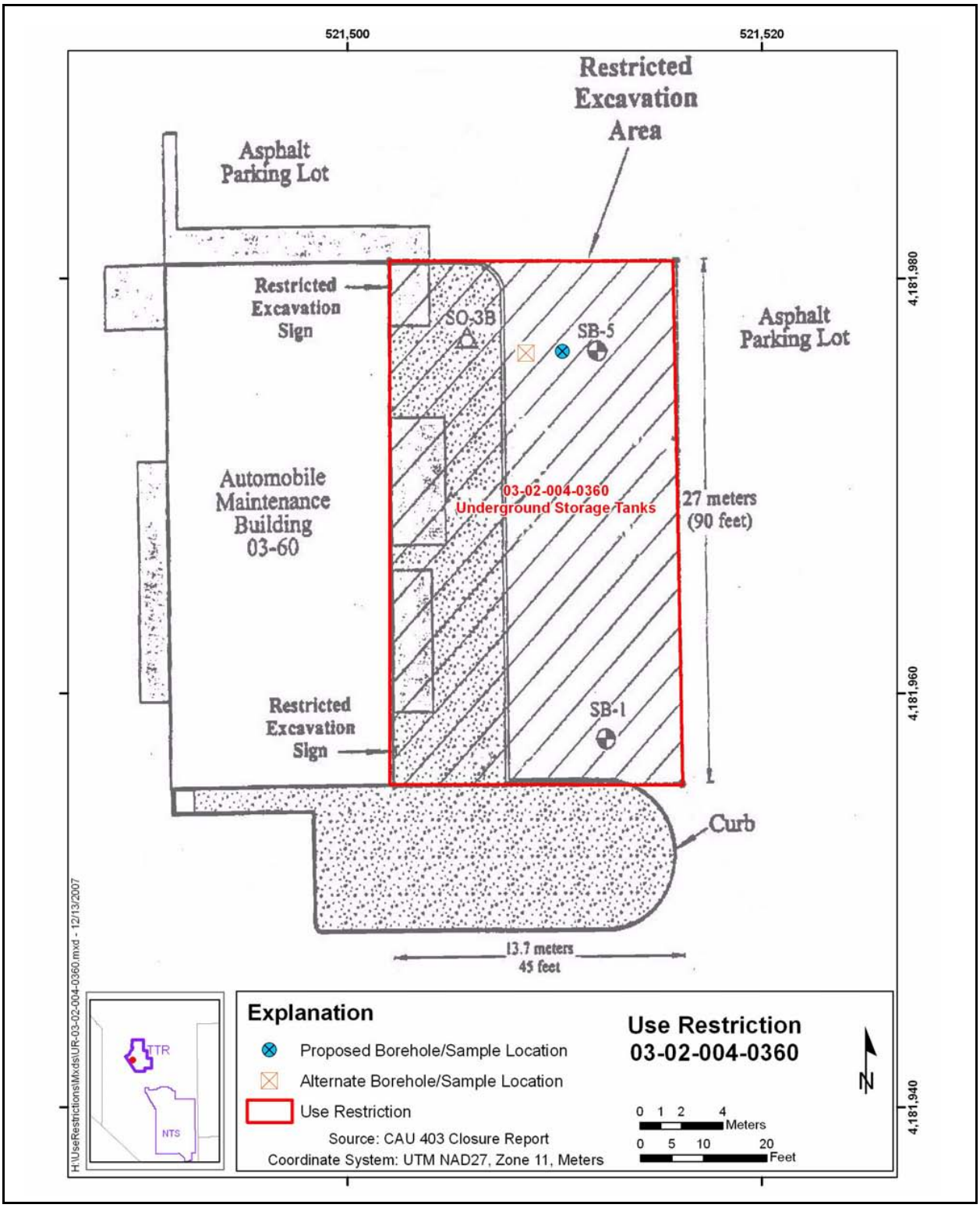

Figure 2-5
Site Sketch of UR 03-02-004-0360, Underground Storage Tanks

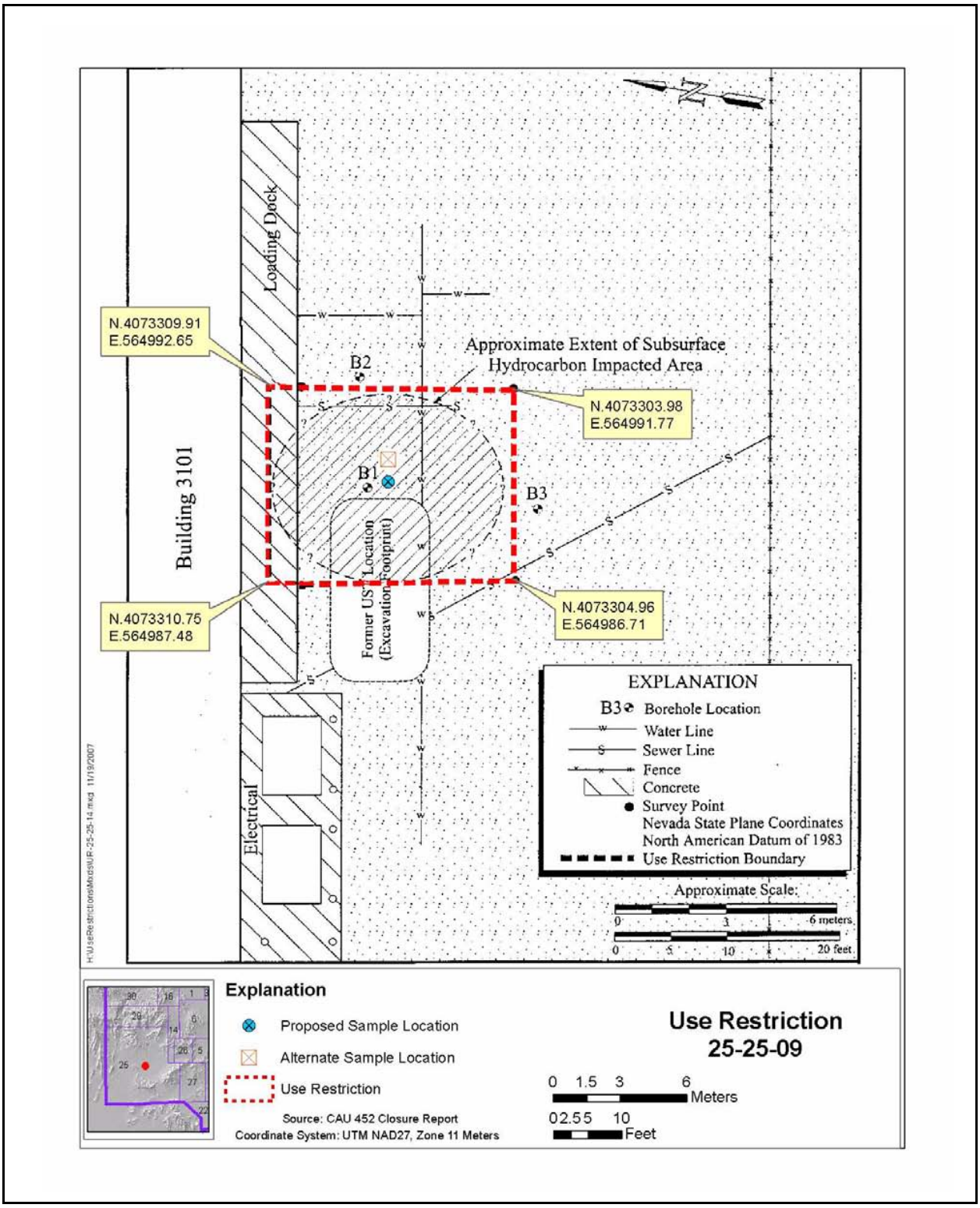

Figure 2-6
Site Sketch of UR 25-25-09, Spill H940825C (from UST 25-3101-1)

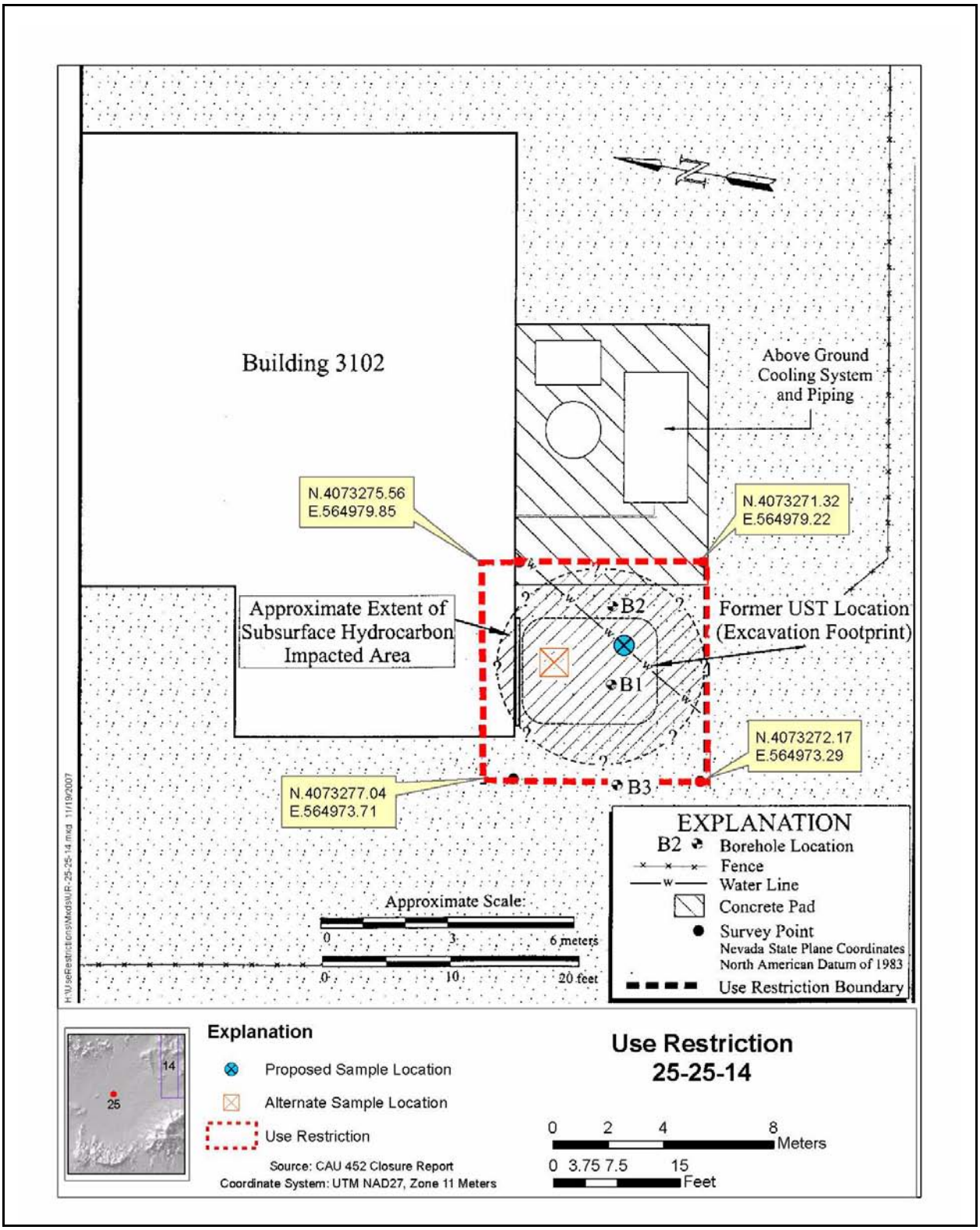

Figure 2-7
Site Sketch of UR 25-25-14, Spill H940314E (from UST 25-3102-3)

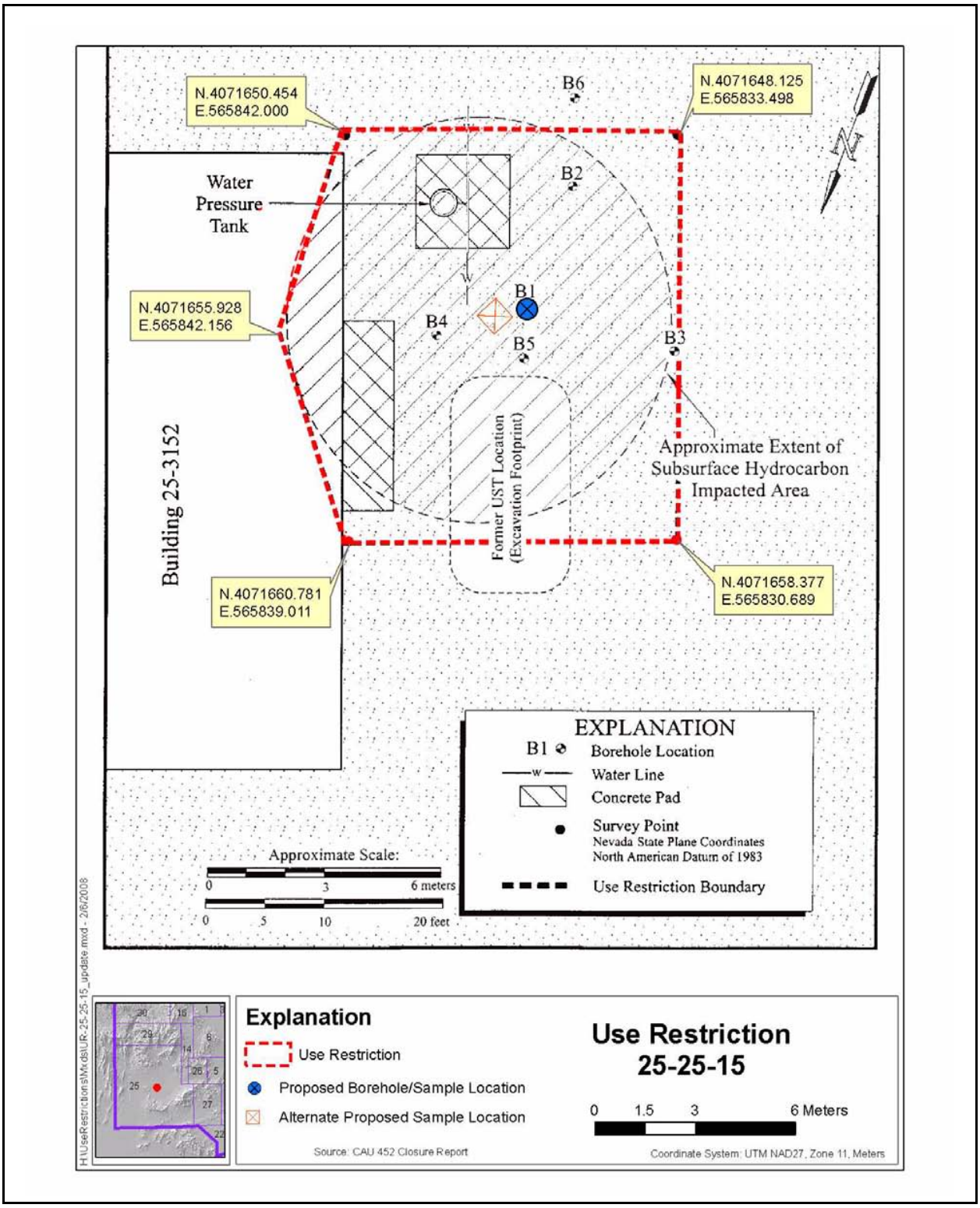

Figure 2-8
Site Sketch of UR 25-25-15, Spill H941020E (from UST 25-3152-1)

2.4.9 Use Restriction 12-25-08, Spill H950524F (from UST 12-B-1)

A UR is in place at the site due to TPH contamination. The UR, as described in the FFACO, states the future use of any land related to this CAU, as described by surveyed location, is restricted from any activity that may alter or modify the containment control as identified by the state and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance. Monitoring requirements have not been identified for the site. Figure 2-9 shows a sketch of the UR.

2.4.10 Use Restriction 12-25-10, Spill H950919A (from UST 12-COMM-1)

A UR is in place at the site due to TPH contamination. The UR, as described in the FFACO, states the future use of any land related to this CAU, as described by surveyed location, is restricted from any activity that may alter or modify the containment control as identified by the state and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance. Monitoring requirements have not been identified for the site. Figure 2-10 shows a sketch of the UR.

2.4.11 Use Restriction 02-02-03, UST 2-300-1

A UR is in place at the site due to TPH contamination. The UR, as described in the FFACO, states the future use of any land related to this CAU, as described by surveyed location, is restricted from any activity that may alter or modify the containment control as identified by the state and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance. Monitoring requirements have not been identified for the site. Figure 2-11 shows a sketch of the UR.

2.4.12 Use Restriction PRL 454, Weathered Diesel Fuel

A UR is in place at the site due to TPH contamination. The UR, as recorded in the FFACO, states the future use of any land related to this CAU, as described by surveyed location, is restricted from any DOE or Air Force activity that may alter or modify the containment control as identified by the state and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance. There are no monitoring requirements associated with the UR. Figure 2-12 shows a sketch of the UR.

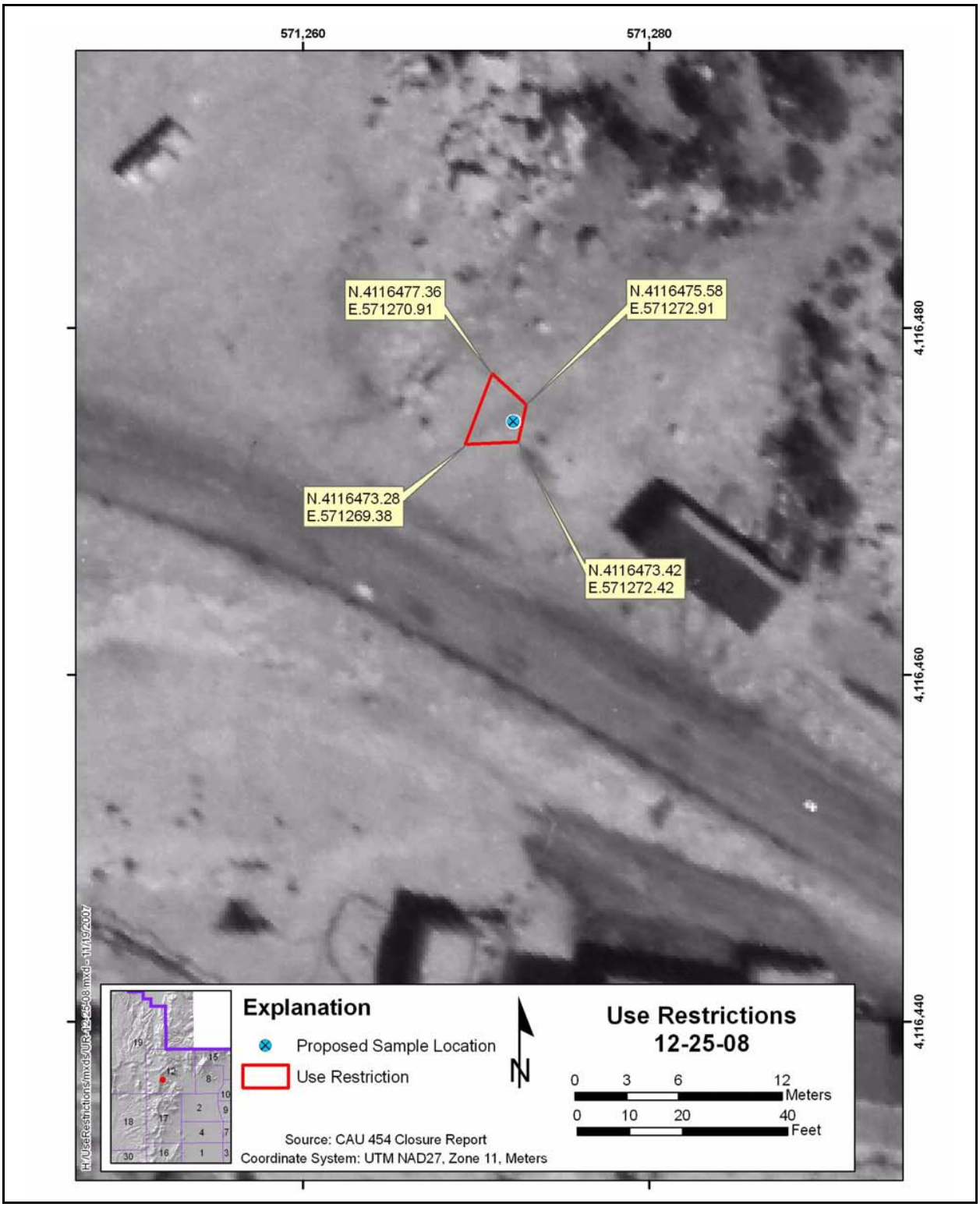

Figure 2-9
Site Sketch of UR 12-25-08, Spill H950524F (from UST 12-B-1)

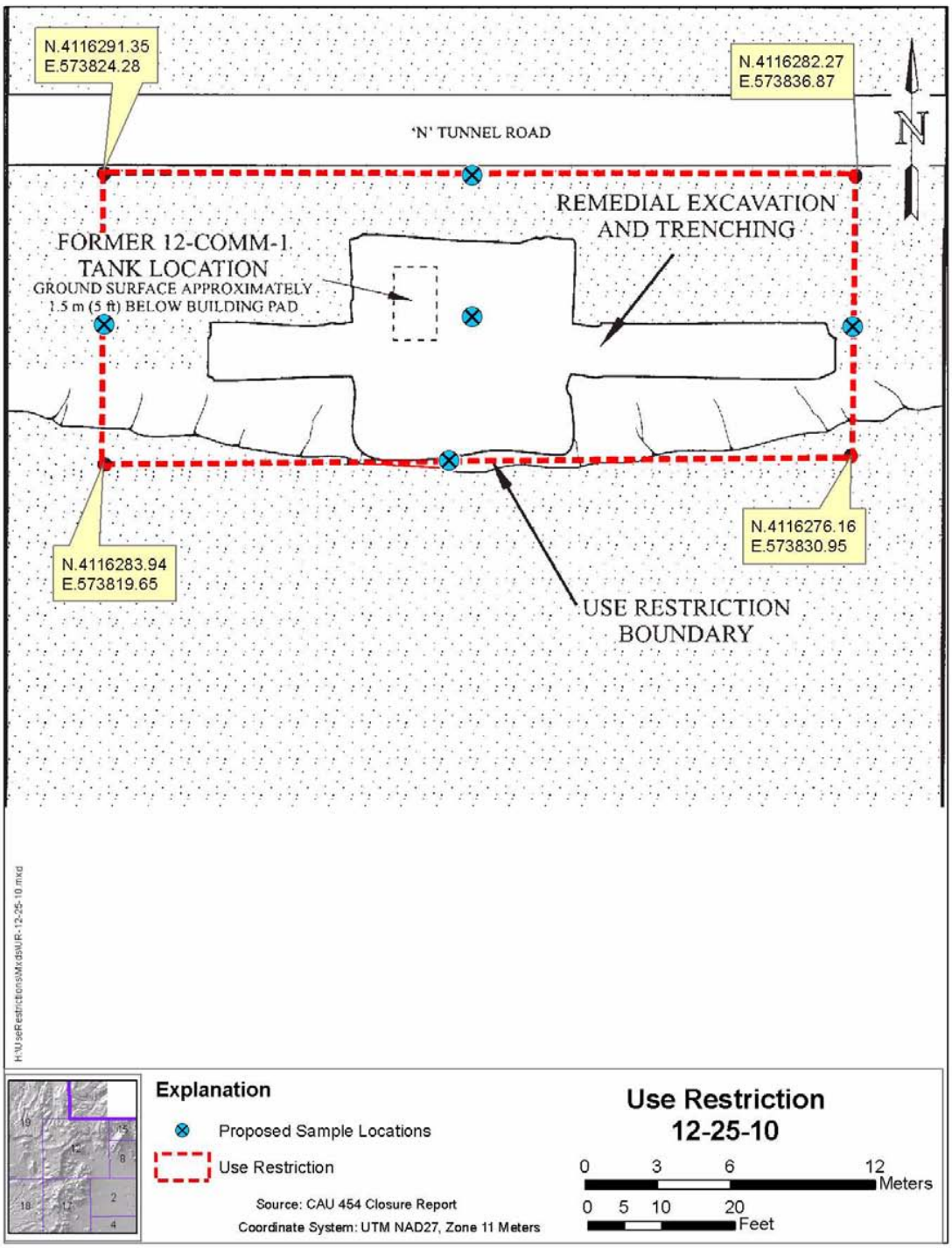

Figure 2-10
Site Sketch of UR 12-25-10, Spill H950919A (from UST 12-COMM-1)

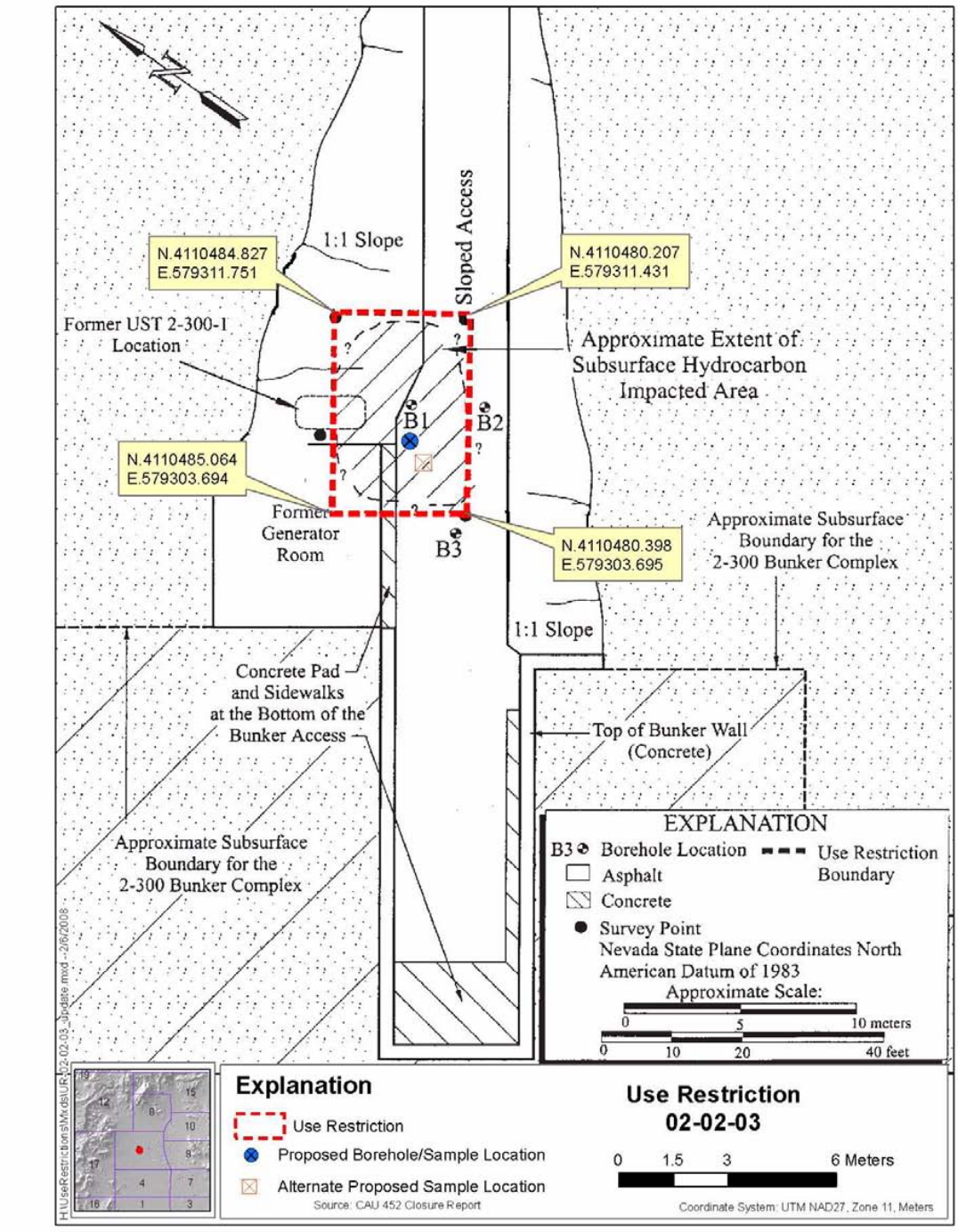

Figure 2-11
Site Sketch of UR 02-02-03, UST 2-300-1

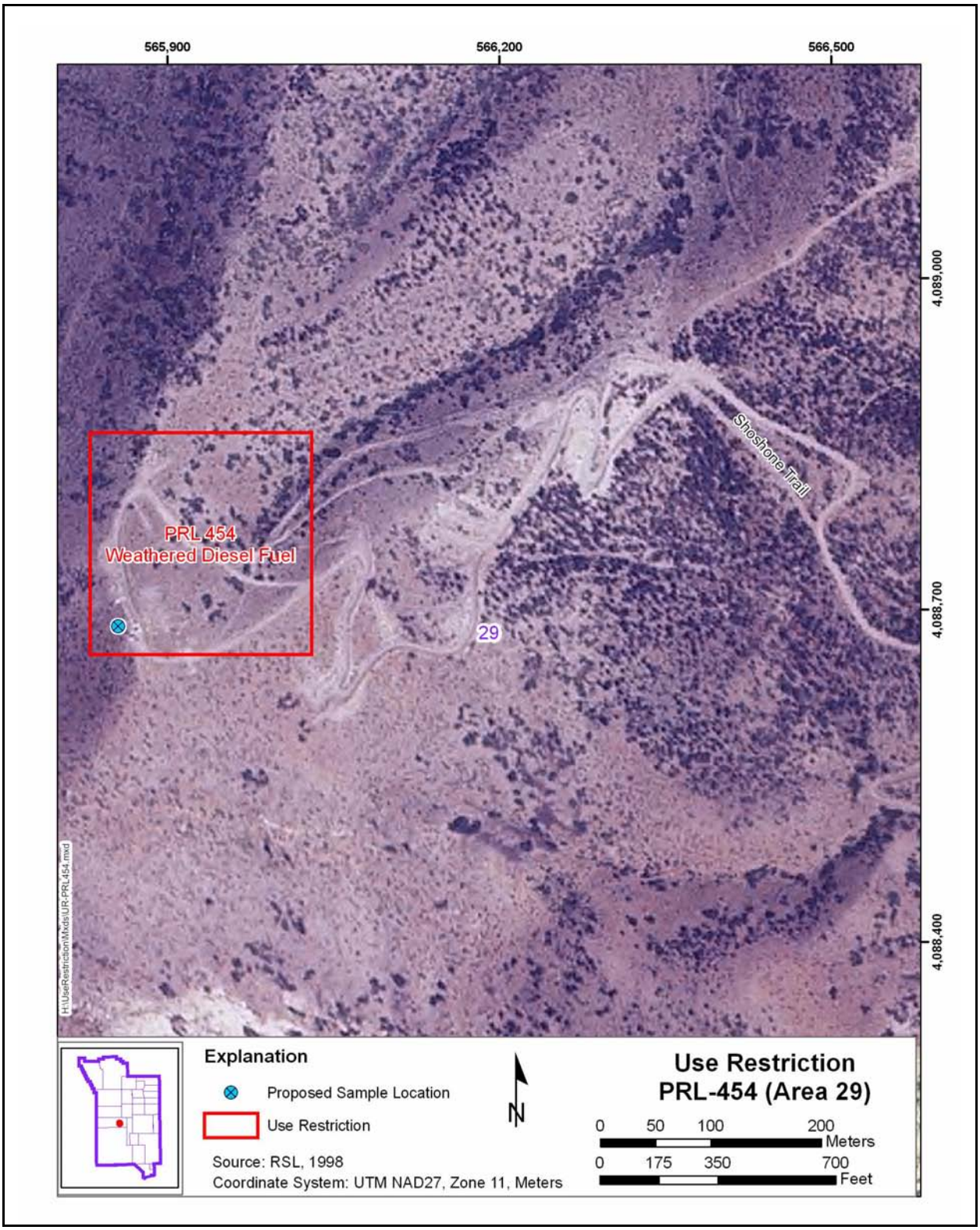

Figure 2-12
Site Sketch of UR PRL 454, Weathered Diesel Fuel

2.5 Investigative Background

The following subsections summarize the previous investigation results that were the basis for establishing the current URs at each site. Other analytical results and information resulting from these investigations are available in the documents listed in Table 1-2.

2.5.1 Use Restriction 06-25-01, CP-1 Heating Oil Release

A full description of previous investigations of CAS 06-25-01 is available in the CAU 326 CR. Samples taken from CAS 06-25-01 were analyzed for TPH, the only COC present. The TPH levels exceeding the action level of 100 mg/kg were detected in 9 of 31 samples; therefore, a UR was implemented. Table 2-1 contains analytical results for soil samples used to establish UR 06-25-01 (NNSA/NV, 2002a).

Table 2-1
Sample Results for the Basis of UR 06-25-01

Sample Identification	Location	Depth (ft bgs)	TPH (mg/kg)
			Action Level 100 mg/kg
062501-13	East pipeline segment	2	**1,500**
062501-22	East pipeline segment	2	**3,000**
062501-23	East pipeline segment	2	**220**
062501-24	East pipeline segment	2	**1,200**
062501-25	East pipeline segment	2	**9,000**
326-B1-10	Borehole Number B1	10	**5,700**
326-B1-45	Borehole Number B1	45	**4,300**
326-B2-05	Borehole Number B2	5	**1,300**
Pipeline 2	Surface grab from break	0	**11,000**
062501-S4	3 ft south of break	2	**4,300**

Note: Bold text indicates value exceeding the action level.

bgs = Below ground surface
ft = Foot
mg/kg = Milligrams per kilogram
TPH = Total petroleum hydrocarbons

2.5.2 Use Restriction 06-25-02, UST Release

A full description of previous investigations of CAS 06-25-02 is available in the CAU 326 CR. The area of the spill was excavated, and two samples taken from the bottom of the excavation were analyzed for TPH as diesel. One of the two samples was taken from a depth of 0.5 to 1 ft below ground surface (bgs) at the east side of the pad (A5DAF318-1). That sample had a TPH diesel level of 261 mg/kg, exceeding the action level of 100 mg/kg; therefore, a UR was implemented (NNSA/NV, 2001).

2.5.3 Use Restriction 12-19-01, A12 Fleet Ops Steam Cleaning Efflu.

A full description of previous investigations of CAS 12-19-01 is available in the CAU 339 Corrective Action Plan. Samples were taken from 13 locations at CAS 12-19-01 and analyzed for TPH as oil and VOCs. Based on the results, TPH as oil is the only COC present. Levels of TPH exceeding the action level of 100 mg/kg were reported at 9 of 13 sample areas; therefore, a UR was implemented. Table 2-2 contains analytical results used to establish UR 12-19-01 (DOE/NV, 1997c).

Table 2-2
Sample Results for the Basis of UR 12-19-01
(Page 1 of 2)

Sample Area	TPH as Oil (mg/kg)
	Action Level 100 mg/kg
1	3,400
2	6,100
3	830
6	490
8	1,300
9[a]	4,800
11[a] (Phase 1 Duplicate of Sample Area 9)	7,200
12[a]	6,000
13[a]	8,600

Table 2-2
Sample Results for the Basis of UR 12-19-01
(Page 2 of 2)

Sample Area	TPH as Oil (mg/kg)
	Action Level 100 mg/kg

Note: Bold text indicates value exceeding the action level.

[a]Based on review of excavation diagrams, this sample location appears to have been excavated and will not be considered during the current investigation.

mg/kg = Milligrams per kilogram
TPH = Total petroleum hydrocarbons

2.5.4 Use Restriction 19-09-05, Mud Pit

A full description of previous investigations of CAS 19-09-05 is available in the CAU 358 CR. Samples taken from CAS 19-09-05 were analyzed for VOCs, SVOCs, TPH full scan, polychlorinated biphenyls (PCBs), total *Resource Conservation and Recovery Act* (RCRA) metals, and gamma spectroscopy. Based on the results, TPH is the only COC present at the site. Levels of TPH exceeding the action level of 100 mg/kg were detected in four of four samples; therefore, a UR was implemented. Table 2-3 contains analytical results for soil samples used to establish UR 19-09-05 (NNSA/NSO, 2004b).

Although VOC and SVOC concentrations were reported below action levels, the action levels and analytical results are not present in the initial investigation documentation. Therefore, this site is included in the current investigation.

2.5.5 Use Restriction 03-02-004-0360, Underground Storage Tanks

A full description of previous investigations of CAS 03-02-004-0360 is available in the CAU 403 CADD. Samples taken from 12 borings at CAS 03-02-004-0360 were analyzed for TPH diesel range, TPH gasoline range, and toxicity characteristic (TC) lead. Based on the results, TPH is the only COC present at the site. Levels of TPH exceeding the action level of 100 mg/kg were detected in 7 of 39 samples; therefore, a UR was implemented. Table 2-4 contains analytical results for soil samples used to establish UR 03-02-004-0360 (DOE/NV, 1997b).

Table 2-3
Sample Results for the Basis of UR 19-09-05

Sample Identification	Depth (ft bgs)	TPH Diesel (mg/kg)	TPH Oil (mg/kg)
		Action Level 100 mg/kg	Action Level 100 mg/kg
190905-0-1MP	Surface	**138**	**970**
190905-6-1MP	0.5	17	**150**
190905-0-2MP	Surface	15	**170**
190905-1-2MP	1.0	22	**170**

Note: Bold text indicates value exceeding the action level.

bgs = Below ground surface
ft = Foot
mg/kg = Milligrams per kilogram
TPH = Total petroleum hydrocarbons

Table 2-4
Sample Results for the Basis of UR 03-02-004-0360

Sample Identification	Boring Identification	Depth (ft bgs)	TPH Diesel (mg/kg)	TPH Fuel Oil #2 (mg/kg)	TPH Gasoline (mg/kg)
			Action Level 100 mg/kg	Action Level 100 mg/kg	Action Level 100 mg/kg
TTR00121	SB-1	2	ND	**1,500**	ND
TTR00124	SB-4	22	ND	**210**	1.2 (Y)
TTR00152	SB-5	2	**120**	ND	ND
TTR00156	SB-5	12	**11,000**	ND	6.4 (Y)
TTR00157	SB-5	12	**10,000**	ND	7.2 (Y)
TTR00153	SB-5	22	**12,000**	ND	**150.0 (Y)**
TTR00158	SO-3B	22	**5,300**	ND	8.6 (Y)

Note: Bold text indicates value exceeding the action level.

bgs = Below ground surface
ft = Foot
mg/kg = Milligrams per kilogram
ND = Not detected
TPH = Total petroleum hydrocarbons
Y = The Gas Chromatograph pattern appears multipeaked but does not match gasoline.

2.5.6 Use Restriction 25-25-09, Spill H940825C (from UST 25-3101-1)

A full description of previous investigations of CAS 25-25-09 is available in the CAU 452 CR. The only COC present at the site is TPH. One sample was collected at the east end of the tank bottom at a depth of 9.5 ft bgs, with a concentration of 2,400 mg/kg, exceeding the action level of 100 mg/kg. A second sample was taken at a later date and at a depth of 12.5 ft bgs had a TPH concentration of 544 mg/kg, exceeding the action level of 100 mg/kg. The CR indicates that these two sampling areas were excavated after sampling. Additionally, 10 samples were taken from boreholes at CAS 25-25-09 and analyzed for TPH (gasoline, diesel, and oil). Of these samples, one Borehole #1 sample at a depth of 20 ft bgs had a TPH diesel level of 420 mg/kg, exceeding the action level of 100 mg/kg; therefore, a UR was implemented (DOE/NV, 1998c).

2.5.7 Use Restriction 25-25-14, Spill H940314E (from UST 25-3102-3)

A full description of previous investigations of CAS 25-25-14 is available in the CAU 452 CR. The only COC present at the site is TPH, and samples collected from a depth of 13 ft bgs from the north and south end of the tank excavation had TPH concentrations of 170 and 620 mg/kg, respectively, exceeding the action level of 100 mg/kg. Additionally, 10 samples were taken from boreholes at CAS 25-25-14 and analyzed for TPH (gasoline, diesel, and oil). Of these samples, one, 3102/B2@15, collected at Borehole 2 from a depth of 15 ft bgs had a TPH diesel level of 1,400 mg/kg, exceeding the action level of 100 mg/kg; therefore, a UR was implemented (DOE/NV, 1998c).

2.5.8 Use Restriction 25-25-15, Spill H941020E (from UST 25-3152-1)

A full description of previous investigations of CAS 25-25-15 is available in the CAU 452 CR. The only COC present at the site is TPH. Samples were collected below the south excavation bottom from a depth of approximately 20 ft bgs from the south end of the tank; one had a TPH concentration of 1,900 mg/kg, exceeding the action level of 100 mg/kg. Additionally, 10 samples were taken from boreholes at CAS 25-25-15 and analyzed for TPH (gasoline, diesel, and oil). Levels of TPH diesel, exceeding the action level of 100 mg/kg, were detected in 4 of 18 samples; therefore, a UR was implemented. Table 2-5 contains analytical results for soil samples used to establish UR 25-25-15 (DOE/NV, 1998c).

Table 2-5
Sample Results for the Basis of UR 25-25-15

Borehole Identification	Sample Identification	Depth (ft bgs)	TPH Diesel (mg/kg)
			Action Level 100 mg/kg
Borehole 1	3152/B1@35	35	**1,700**
Borehole 1	3152/B1@40	40	**620**
Borehole 2	3152/B2@40	40	**120**
Borehole 4	3152/B4@35	35	**1,600**

Note: Bold text indicates value exceeding the action level.

bgs = Below ground surface
ft = Foot
mg/kg = Milligrams per kilogram
TPH = Total petroleum hydrocarbons

2.5.9 Use Restriction 12-25-08, Spill H950524F (from UST 12-B-1)

A full description of previous investigations of CAS 12-25-08 is available in the CAU 454 CR. The only COC present at the site is TPH. Of two samples collected, one taken at the east side of the excavation, with a TPH diesel concentration of 490 mg/kg, exceeded the action level of 100 mg/kg; therefore, a UR was implemented. A second sample taken at the west side of the excavation had a TPH diesel level of 92 mg/kg, which is below the action level (DOE/NV, 1998d).

2.5.10 Use Restriction 12-25-10, Spill H950919A (from UST 12-COMM-1)

A full description of previous investigations of CAS 12-25-10 is available in the CAU 454 CR. Samples taken from CAS 12-25-10 were analyzed for TPH-oil, Toxicity Characteristic Leaching Procedure (TCLP) metals, and PCBs. Based on the results, TPH is the only COC present. Concentrations of TPH, exceeding the action level of 100 mg/kg, were detected in six of eight samples. These samples were from a lens of gray material visible in the excavation and attributed to an earlier release. Additional excavation was performed after samples were taken, and the lens of gray material was still visible in remaining soils; therefore, a UR was implemented. Table 2-6 contains analytical results for soil samples taken before excavation (DOE/NV, 1998d). Although

Table 2-6
Sample Results for the Basis of UR 12-25-10

Sample Identification	Depth (ft bgs)	TPH - Oil (mg/kg)
		Action Level 100 mg/kg
12-COMM-1/N. Wall	3	**1,600**
12-COMM-1/N. Btm	6	**120**
12-COMM-1/E. Wall	3	**740**
12-COMM-1/W. Wall	3	**1,200**
12-COMM-1/S. Wall	3	**1,800**
12-COMM-1/S. Btm	6	**600**

Note: Bold text indicates value exceeding the action level.

bgs = Below ground surface
ft = Foot
mg/kg = Milligrams per kilogram
TPH = Total petroleum hydrocarbons

these soils were removed, it is assumed that the remaining gray lens material has similar concentrations.

2.5.11 Use Restriction 02-02-03, UST 2-300-1

A full description of previous investigations of CAS 02-02-03 is available in the CAU 464 CR. The only COC present at the site is TPH. Twelve samples were taken from boreholes at CAS 02-02-03 and analyzed for TPH diesel. Of these samples, one sample taken at 15 ft bgs at Borehole 1 (2-300/B1@15) had a TPH diesel level of 230 mg/kg, exceeding the action level of 100 mg/kg; therefore, a UR was implemented (DOE/NV, 1998e).

2.5.12 Use Restriction PRL 454, Weathered Diesel Fuel

A full description of previous investigations of CAS PRL 454 is available in the report entitled *Environmental Compliance Program Final UST Remediation Action Report: Phase 2, Offbase Excavate and Remove Sites* (Lockheed Martin Energy Systems, Inc., 1998). Samples taken from CAS PRL 454 were analyzed for TPH diesel and unknown extractable hydrocarbons (UEH). Based

on the results, diesel was present below the reporting limit (RL) of 250 mg/kg and UEH was present at 3,800 mg/kg in one composite sample; therefore, a UR was implemented.

2.5.13 National Environmental Policy Act

The *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* (DOE/NV, 1996b) is applicable to site investigation activities such as those proposed for this SIP.

In accordance with the NNSA/NSO *National Environmental Policy Act* (NEPA) Compliance Program, a NEPA checklist will be completed before site investigation activities begin at each UR. This checklist requires NNSA/NSO project personnel to evaluate proposed project activities against a list of potential impacts that include, but are not limited to: air quality, chemical use, waste generation, noise level, and land use. Completion of the checklist results in a determination of the appropriate level of NEPA documentation by the NNSA/NSO NEPA Compliance Officer. This will be accomplished before mobilization for the field investigation.

3.0 Objectives

This section presents an overview of the DQOs for this SIP and a summary of the CSM. Also presented is a summary listing of the contaminants known to be present at each UR (i.e., target contaminants), the COPCs, preliminary action levels (PALs) for the investigation, and the process used to establish FALs. Additional details depicting the CSM are located in Appendix A.

3.1 Conceptual Site Model

The CSM describes the most probable scenario for current conditions at each UR and defines the assumptions that are the basis for identifying the future land use, contaminant sources, release mechanisms, migration pathways, exposure points, and exposure routes. The CSM is also used to support appropriate sampling strategies and data collection methods. For the 12 URs addressed in this document, the CSMs were presented in the previous investigation documents. These CSMs were validated by investigation data for each UR collected during the initial CAI. The UR and site conditions information and assumptions are documented in the respective CAU closure documents and include general physical settings, contaminant sources, release information, knowledge of similar sites; and physical and chemical properties of the affected media, and identified COCs (i.e., TPH).

The following sections discuss the future land use and identification of exposure pathways (i.e., combination of source, release, migration, exposure point, and receptor exposure route) for the URs.

3.1.1 Land-Use and Exposure Scenarios

Use Restrictions 25-25-09, 25-25-14, and 25-25-15 are located in the NTS land-use zone described as the Research, Test, and Experiment Zone. This area is designated for small-scale research and development projects and demonstrations, pilot projects, outdoor tests; and experiments for the development, quality assurance, or reliability of material and equipment under controlled conditions. This zone includes compatible defense and non-defense research, development and testing projects and activities (DOE/NV, 1998b).

Use Restrictions 02-02-03, 12-19-01, 12-25-08, and 12-25-10 are located in the NTS land-use zone described as "Nuclear and High Explosives Test" within the NTS. This area is designated within the Nuclear Test Zone for additional underground nuclear weapons tests and outdoor high-explosive tests. This zone includes compatible defense and non-defense research, development, and testing activities (DOE/NV, 1998b).

Use Restrictions 06-25-01 and 06-25-02 are located in the NTS land-use zone described as "Defense Industrial Zone" within the NTS. This area is designated for stockpile management of weapons; including production, assembly, disassembly or modification, staging, repair, retrofit, and surveillance. Also included in this zone are permanent facilities for stockpile stewardship operations involving equipment and activities such as radiography, lasers, material processing, and pulsed power (DOE/NV, 1998b).

Use Restriction PRL 454 is located in the NTS land-use zone described as "Reserved" within the NTS. This area includes land and facilities that provide widespread flexible support for diverse short-term testing and experimentation. The reserved zone is also used for short-duration exercises and training such as nuclear emergency response, Federal Radiological Monitoring and Assessment Center training, and U.S. Department of Defense (DoD) land-navigation exercises and training (DOE/NV, 1998b).

All land-use zones, where the URs are located, dictate future land use and restrict current and future land-use to non-residential (i.e., industrial) activities.

Exposure scenarios for the URs have been categorized into the following two types based on current and projected future land uses:

- Industrial Area for URs 06-25-01, 06-25-02, and 03-02-004-0360. This exposure scenario assumes industrial use of a site. This scenario addresses exposure to industrial workers who are continuously exposed to contaminants in soil during each workday for an entire career (i.e., 225 days per year, 8 hours per day for 25 years).

- Occasional Use Area for URs 12-19-01, 19-09-05, 25-25-09, 25-25-14, 25-25-15, 12-25-08, 12-25-10, 02-02-03, and PRL 454. This exposure scenario assumes exposure to industrial workers who are not assigned to the area as a regular worksite but may occasionally use the site for intermittent or short-term activities. A site worker under this scenario is assumed to be on the site for an equivalent of 8 hours per day, 10 days per year, for 5 years.

3.1.2 Contaminant Sources and Release Mechanisms

The contaminant source and release mechanisms for all of the URs are diesel or fuel oil spills and/or leaks onto surface and subsurface soils from a variety of ASTs, USTs, and/or generators. In all cases, the source of release (i.e., tank or contaminated soil) was removed or spill containment installed (in the case of active tanks).

3.1.3 Migration Pathways

The migration pathways and transport mechanisms are documented for each UR in the respective closure document. Previous investigations at each UR confirmed infiltration and percolation of precipitation, as a driving force for downward migration of contaminants, is limited as a result of high-potential evapotranspiration and limited precipitation for this region. Surface migration through stormwater runoff is a viable migration pathway. Both migration pathways have been addressed by the individual investigations at each site. Each investigation report documents that migration at each site was limited, the extent of COC contamination at each site was defined, and no groundwater pathway was identified.

3.1.4 Exposure Points

Exposure points are areas of surface TPH contamination where visitors, site workers, and/or military personnel may come in contact with surface soil. Subsurface exposure points exist if site workers come in contact with TPH-contaminated media during excavation activities.

3.1.5 Exposure Routes

Exposure routes to site workers and military personnel include ingestion, inhalation, and/or dermal contact (absorption) from disturbance of, or direct contact with, TPH-contaminated media.

3.1.6 Additional Information

Information concerning topography, geology, climatic conditions, hydrogeology, floodplains, and infrastructure at the URs is available in the respective investigation report. Table 1-2 provides a list that documents the appropriate investigation report where this information is available.

3.2 Contaminants of Potential Concern

Each UR proposed for supplemental investigation has identified TPH as the COC and the basis of the UR. The COPCs are the potentially hazardous constituents of TPH (see Table 1-1). The potentially hazardous constituent concentrations of TPH at each UR site are not available because VOC and SVOC analysis was either, not conducted as part of the initial investigation, or complete analytical data are not available. The VOC and SVOC analytical methods provide the analytical results listed in Table 3-1 that include the potentially hazardous constituents of TPH.

Table 3-1
Constituents Reported by Analytical Methods

Volatile Organic Compounds		Semivolatile Organic Compounds	
1,1,1-Trichloroethane	Chloroform	2,3,4,6-Tetrachlorophenol	Dibenzofuran
1,1,1,2-Tetrachloroethane	Chloromethane	2,4-Dimethylphenol	Diethyl Phthalate
1,1,2,2-Tetrachloroethane	Chloroprene	2,4-Dinitrotoluene	Dimethylphthalate
1,1,2-Trichloroethane	Dibromochloromethane	2,4,5-Trichlorophenol	Di-n-butylphthalate
1,1-Dichloroethane	Dichlorodifluoromethane	2,4,6-Trichlorophenol	Di-n-octyl Phthalate
1,1-Dichloroethene	Ethyl methacrylate	2-Chlorophenol	Fluoranthene
cis-1,2-Dichloroethene	Ethylbenzene	2-Methylnaphthalene	Fluorene
1,2-Dichloroethane	Isobutyl alcohol	2-Methylphenol	Hexachlorobenzene
1,2-Dichloropropane	Isopropylbenzene	2-Nitrophenol	Hexachlorobutadiene
1,2,4-Trichlorobenzene	m-Dichlorobenzene (1,3)	3-Methylphenol[a]	Hexachloroethane
1,2,4-Trimethylbenzene	Methacrylonitrile	4-Chloroaniline	Indeno(1,2,3-cd)pyrene
1,2-Dibromo-3-chloropropane	Methyl methacrylate	4-Methylphenol[a]	Naphthalene[b]
1,3,5-Trimethylbenzene	Methylene chloride	4-Nitrophenol	Nitrobenzene
1,4-Dioxane	N-Butylbenzene	Acenaphthene	N-Nitroso-di-n-propylamine
2-Butanone	N-Propylbenzene	Acenaphthylene	Pentachlorophenol
2-Chlorotoluene	o-Dichlorobenzene (1,2)	Aniline	Phenanthrene
2-Hexanone	p-Dichlorobenzene (1,4)	Anthracene	Phenol
4-Methyl-2-pentanone	p-isopropyltoluene	Benzo(a)anthracene	Pyrene
Acetone	sec-Butylbenzene	Benzo(a)pyrene	Pyridine
Acetonitrile	Styrene	Benzo(b)fluoranthene	
Allyl chloride	tert-Butylbenzene	Benzo(g,h,i)perylene	
Benzene	Tetrachloroethene	Benzo(k)fluoranthene	
Bromodichloromethane	Toluene	Benzoic Acid	
Bromoform	Total Xylenes	Benzyl Alcohol	
Bromomethane	Trichloroethene	Bis(2-ethylhexyl) phthalate	
Carbon disulfide	Trichlorofluoromethane	Butyl benzyl phthalate	
Carbon tetrachloride	Vinyl acetate	Carbazole	
Chlorobenzene	Vinyl chloride	Chrysene	
Chloroethane		Dibenzo(a,h)anthracene	

[a]May be reported as 3,4-methylpenol
[b]May be reported with VOCs

Targeted contaminants are those COPCs for which evidence in available site and process information suggests presence may be reasonably suspected at a given UR. The targeted contaminants are required to meet a more stringent completeness criteria than other COPCs thus providing greater protection against a decision error (see Section A.8.0). Targeted contaminants for each UR are identified as the potentially hazardous constituents of TPH.

Analysis for TPH will also be conducted on all samples to confirm that the areas sampled are the areas of highest TPH contamination as reported in the closure document that established the UR.

3.3 Preliminary Action Levels

The PALs presented in this section are to be used for site screening purposes. They are not necessarily intended to be used as clean-up action levels or FALs. However, they are useful in screening out contaminants that are not present in sufficient concentrations to warrant further evaluation and, therefore, streamline the consideration of remedial alternatives. All PALs are defined as the U.S. Environmental Protection Agency (EPA) Region 9 Risk-Based Preliminary Remediation Goals (PRGs) for contaminant constituents in industrial soils (EPA, 2004). For detected chemical COPCs without established PRGs, the protocol used by the EPA Region 9 in establishing PRGs (or similar) will be used to establish PALs. If used, this process will be documented in the investigation report.

The RBCA process used to establish FALs is described in the *Industrial Sites Project Establishment of Final Action Levels* (NNSA/NSO, 2006a). This process conforms with NAC Section 445A.227 (NAC, 2006b) which lists the requirements for sites with soil contamination. For the evaluation of corrective actions, NAC Section 445A.22705 (NAC, 2006c) requires the use of ASTM Method E 1739 (ASTM, 1995) to "conduct an evaluation of the site, based on the risk it poses to public health and the environment, to determine the necessary remediation standards (i.e., FALs) or to establish that corrective action is not necessary."

This RBCA process (Figure 3-1) defines the following three tiers (or levels) of evaluation involving increasingly sophisticated analyses:

- Tier 1 evaluation - Sample results from source areas (highest concentrations) are compared to action levels based on generic (non-site-specific) conditions (i.e., the PALs established in the

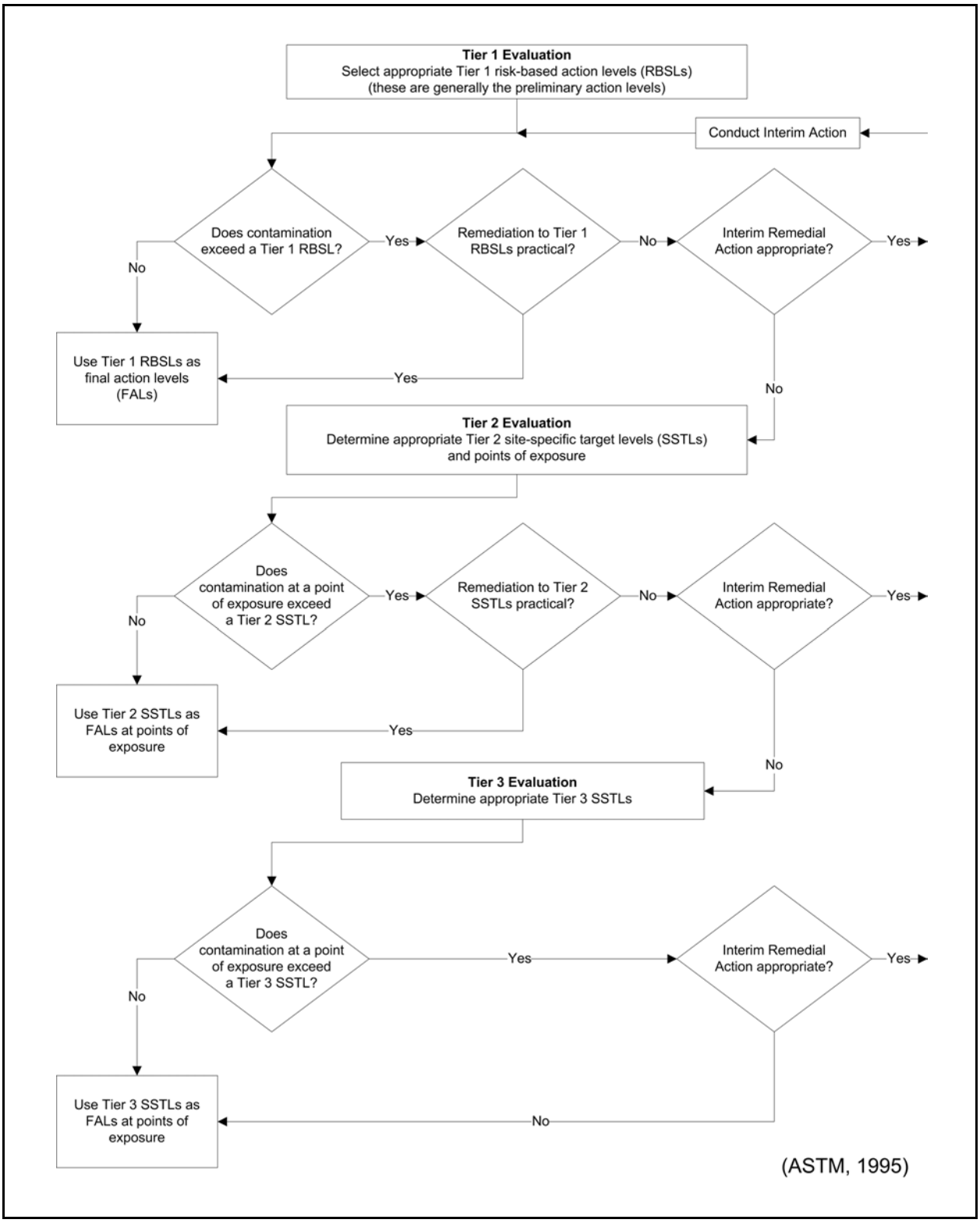

Figure 3-1
Risk-Based Corrective Action Decision Process

SIP). The FALs may then be established as the Tier 1 action levels or the FALs may be calculated using a Tier 2 evaluation.

- Tier 2 evaluation - Conducted by calculating Tier 2 site-specific target levels (SSTLs) using site-specific information as inputs to the same or similar methodology used to calculate Tier 1 action levels. The Tier 2 SSTLs are then compared to individual sample results from reasonable points of exposure (as opposed to the source areas as is done in Tier 1) on a point-by-point basis. Total TPH concentrations will not be used for risk-based decisions under Tier 2 or Tier 3. Rather, the individual chemicals of concern will be compared to the SSTLs.

- Tier 3 evaluation - Conducted by calculating Tier 3 SSTLs on the basis of more sophisticated risk analyses using methodologies described in Method E 1739-95 that consider site-, pathway-, and receptor-specific parameters.

The comparison of laboratory results to the FALs are used to evaluate the need for, and type of, UR at each site. The FALs will be defined (along with the basis for their definition) in the investigation report. The FALs are based on the risk posed by the COPCs that are associated with TPH as listed in Table 1-1.

The FALs (along with the basis for their selection) will be proposed in the investigation report, where they will be compared to laboratory results, in the evaluation of potential corrective actions.

3.4 Data Quality Objective Process Discussion

This section contains a summary of the DQO process that is presented in Appendix A. The DQO process is a strategic planning approach based on the scientific method that is designed to ensure that the data collected will provide sufficient and reliable information to identify, evaluate, and technically defend the recommendation of viable corrective actions (which is to modify or remove the current UR).

The DQO strategy for the supplemental investigation was developed at a meeting on December 3, 2007. The DQOs were developed to identify data needs, clearly define the intended use of the environmental data, and to design a data collection program to satisfy these purposes. During the DQO discussions for these URs, the informational inputs or data needs to resolve problem statements and decision statements were documented.

The problem statement for this SIP is: "Existing information on the nature of TPH contamination is insufficient to realign historical URs with current risk-based decision methodology." To address this problem, the resolution of the following decision statement is required:

"Are any TPH constituents above FALs present in environmental media within the UR?"

Any analytical results for a COPC above the FAL will result in that COPC being designated as a COC. A COC may also be defined as a contaminant that, in combination with other like contaminants, is determined to jointly pose an unacceptable risk based on a multiple constituent analysis (NNSA/NSO, 2006a).

If the site does not contain a contaminant exceeding a FAL, the UR will be removed. If the site contains a contaminant exceeding a FAL, the recommendation will be to modify the UR based on the following decision hierarchy:

1. If the site contains a contaminant exceeding a FAL based on the site-specific foreseeable future land-use exposure scenario (see Section 3.1.1), the full FFACO UR will remain.

Otherwise:

2. If the site contains a contaminant exceeding a FAL based on the Industrial Area exposure scenario, the UR will be modified to an administrative UR. Changing a UR to an administrative UR would eliminate associated costs including: ongoing inspection and maintenance, UR database maintenance, tracking site usages, and restrictions to future site activities.

The data quality indicators (DQIs) of precision, accuracy, representativeness, completeness, comparability, and sensitivity needed to satisfy DQO requirements are discussed in Section 6.2. Laboratory data will be assessed in the investigation report to determine whether the DQO data needs were met.

To satisfy the DQI of sensitivity (see Section 6.2.8), the analytical methods must be sufficient to detect contamination that is present in the samples at concentrations less than or equal to the corresponding FALs. Analytical methods and target minimum detectable concentrations (MDCs) for each UR COPC are provided in Table 3-2. The MDC is the lowest concentration of a chemical parameter that can be detected in a sample within an acceptable level of error. Due to changes in

Table 3-2
Analytical Requirements for Chemical COPCs

Analysis[a]	Matrix	Analytical Method (SW-846)[b]	Minimum Detectable Concentration (MDC)[c]	Laboratory Precision (RPD)	Laboratory Accuracy (%R)
ORGANICS					
Total VOCs	All	8260B	< PALs	Lab-specific[d]	Lab-specific[d]
Total SVOCs	All	8270C	< PALs	Lab-specific[d]	Lab-specific[d]
TPH-DRO	All	8015B (modified)	< PALs	Lab-specific[d]	Lab-specific[d]

[a]Applicable constituents are listed in Table 3-1.
[b]*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (SW-846) (EPA, 1996).
[c]The MDC is the lowest concentration that can be reliably achieved within specified limits of accuracy and precision.
[d]RPD and %R performance criteria are developed by the analytical laboratory according to approved procedures.

DRO = Diesel-range organics
PAL = Preliminary action level
RPD = Relative percent difference
SVOC = Semivolatile organic compound
TPH = Total petroleum hydrocarbons
VOC = Volatile organic compound
%R = Percent recovery
< = Less than

analytical methodology, and changes in analytical laboratory contracts, information in Table 3-2 that varies from corresponding information in the QAPP will supersede the QAPP (NNSA/NV, 2002b).

4.0 Field Investigation

This section contains a description of the activities to be conducted to gather and document information from the UR field investigation.

4.1 Technical Approach

The information necessary to satisfy the DQO data needs will be generated for each UR by collecting and analyzing samples generated during a field investigation. The presence and nature of the potentially hazardous constituents of TPH will be evaluated at each UR using a judgmental approach. The URs will be modified, removed, or left in place based upon the risk posed by these constituents of TPH. If contamination at any site poses a risk that requires a UR to remain (i.e., an FFACO UR or an administrative UR), the extent (i.e., area) of the UR will not be changed because extent samples will not be collected.

Modifications to the investigative strategy may be required should unexpected field conditions be encountered at any UR. Significant modifications shall be justified and documented before implementation. If an unexpected condition indicates that conditions are significantly different than the corresponding CSM, the activity will be rescoped and the identified decision-makers will be notified.

4.2 Field Activities

Field activities for all the URs include site preparation, sample location selection, and sample collection activities.

4.2.1 Site Preparation Activities

Site preparation activities conducted by the NTS or TTR management and operating contractor before the investigation may include relocating or removing surface debris, equipment, and structures; constructing hazardous waste accumulation areas (HWAAs) and site exclusion zones; providing sanitary facilities; constructing decontamination facilities; and temporarily moving staged equipment.

Before mobilization for collecting investigation samples, visual surveys will be conducted at all URs to identify previous sample borings and/or surface sample locations and any staining, discoloration, disturbance of native soils, or other indication of remaining TPH contamination.

4.2.2 Sample Location Selection

Samples collected from each UR will be from locations that represent the highest TPH contamination. To achieve this criterion, samples will be located in the same location of the highest TPH sample result upon which the UR is based. When this is not feasible, sample locations will be selected using the following biasing factors:

- Elevated VOC headspace analysis result.
- Stains and/or odor: Any spot or area on the soil surface that may indicate the presence of a TPH contamination. Typically, stains indicate an organic liquid such as an oil has reached the soil, and may have spread out vertically and horizontally.
- Pre-selected areas based on process knowledge of the site: Locations for which evidence such as investigation photographs, previous tank excavation evidence, soil boring locations, or previous investigations exists where releases of TPH have occurred.
- Pre-selected areas based on process knowledge of the contaminant(s): Locations that may reasonably have received contamination, selected on the basis of the chemical and/or physical properties of the contaminant(s) in that environmental setting.
- Visual indicators such as discoloration, textural discontinuities, disturbance of native soils, or any other indication of potential contamination.

The UR-specific sampling strategy and the estimated locations of biased samples for each UR are presented in Appendix A. The locations and depth intervals may be modified by the Task Manager or Site Supervisor, as warranted by site conditions, to achieve DQO criteria stipulated in Appendix A. Where sampling locations are modified by the Task Manager or Site Supervisor, the justification for the modification will be documented in the field logbook.

4.2.3 Sample Collection

The UR sampling program will consist of the following activities:

- Collect and analyze samples from locations as described in this section.
- Collect required QC samples.
- Record Global Positioning System coordinates for each environmental sample location.

Surface (0 to 0.5 ft bgs) and subsurface (0.5 to 50 ft bgs) soil samples will be collected at intervals consistent with the highest remaining TPH contamination as documented in each closure document. Soil samples may be collected by hand/power augering, backhoe excavation, direct-push, or drilling techniques, as appropriate. Subsurface soil samples will collected at depth intervals selected by the Task Manager or Site Supervisor based on biasing factors.

Extent of contamination sampling is not planned for this UR investigation because the lateral and vertical extent of TPH contamination has been established, based on validated laboratory analytical results, during the initial corrective action investigation and/or the closure activities.

4.2.4 Sample Management

The laboratory requirements (i.e., MDCs, precision, and accuracy) to be used when analyzing the COPCs are presented in Table 3-2. All sampling activities and QC requirements for field and laboratory environmental sampling will be conducted in compliance with the IS QAPP (NNSA/NV, 2002b) and other applicable, approved procedures.

4.3 Safety

A site-specific health and safety document will be prepared and approved before the field effort. As required by the DOE Integrated Safety Management System (ISMS) (DOE/NV, 1997d), this document will outline the requirements to protect the health and safety of site workers and the public. The ISMS program requires that site personnel will reduce or eliminate the possibility of injury, illness, or accidents, and protect the environment during all project activities. The following safety

issues will be taken into consideration when evaluating the hazards and associated control procedures for field activities:

- Potential hazards to site personnel and the public include, but are not limited to: chemicals (e.g., heavy metals, VOCs, SVOCs, and petroleum hydrocarbons), adverse and rapidly changing weather, remote location, and motor vehicle and heavy equipment operations.

- Proper training of all site personnel to recognize and mitigate the anticipated hazards.

- Work controls to reduce or eliminate the hazards including engineering controls, substitution of less hazardous materials, and use of appropriate personal protective equipment (PPE).

- Occupational exposure monitoring to prevent overexposure to hazards such as heat, cold, and high wind.

- Emergency response and communications, and contingency planning include medical care and evacuation, decontamination, spill control measures, and appropriate notification of project management.

4.4 Site Restoration

After completion of the UR investigation and waste management activities, the following actions will be implemented before closure of the site Real Estate/Operations Permit:

- Remove equipment, wastes, debris, and materials associated with the investigation.
- Remove signage and fencing.
- Grade the site to pre-investigation condition.
- Inspect and certify that restoration activities have been completed at the site.

5.0 Waste Management

Management of investigation-derived waste (IDW) will be based on regulatory requirements, field observations, process knowledge, and laboratory results from the UR investigation samples.

Disposable sampling equipment, PPE, and rinsate are considered to be potentially contaminated waste only by virtue of contact with potentially contaminated media (e.g., soil) or potentially contaminated debris (e.g., construction materials). Therefore, sampling and analysis of IDW, separate from analyses of site investigation samples, may not be necessary for all IDW. However, if associated investigation samples are found to contain contaminants above regulatory levels, conservative estimates of total waste contaminant concentrations may be made based on the mass of the waste, the amount of contaminated media contained in the waste, and the maximum concentration of contamination found in the media. Direct samples of IDW may also be taken to support waste characterization.

The URs addressed in this SIP have been previously investigated for nature and extent of contamination and established that TPH as diesel/oil is the only COC at each UR. Based on TPH as the only COC, the potentially hazardous constituents of TPH are identified as the only COPCs being analyzed at each UR. Due to the planned sampling activities at each UR, management of soil or debris is not expected. Therefore, based on ample site process knowledge, the detailed sections for low-level radioactive waste, mixed low-level waste, PCBs, management of soil and debris, and field-screening waste have been removed from this SIP because they are not anticipated waste streams.

Sanitary, hazardous, radioactive, and/or mixed waste, if generated, will be managed and disposed of in accordance with applicable DOE orders, U.S. Department of Transportation (DOT) regulations, state and federal waste regulations, and agreements and permits between DOE and NDEP.

5.1 Waste Minimization

Investigation activities are planned to minimize IDW generation. This will be accomplished by incorporating the use of process knowledge, visual examination, and/or radiological survey and swipe results. When possible, disturbed media (such as soil removed during trenching) or debris will be

returned to its original location. Contained media (e.g., soil managed as waste), although not expected, as well as other IDW, will be segregated to the greatest extent possible to minimize generation of hazardous, radioactive, or mixed waste. Hazardous material used at the sites will be controlled to limit unnecessary generation of hazardous or mixed waste. Administrative controls, including decontamination procedures and waste characterization strategies, will minimize waste generated during investigations. Where possible, (wet) decontamination will be performed over sampling location itself, to eliminate or at least minimize the accumulation and subsequent disposal of decontamination rinsate as waste, as appropriate.

5.2 Potential Waste Streams

Waste generated during the investigation activities will include the following potential waste streams:

- Personal protective equipment and disposable sampling equipment (e.g., plastic, paper, sample containers, aluminum foil, spoons, bowls)
- Decontamination rinsate

5.3 Investigation-Derived Waste Management

The onsite management and ultimate disposition of IDW will be determined based on a determination of the waste type (e.g., sanitary, low-level, hazardous, hydrocarbon, mixed), or the combination of waste types. A determination of the waste type will be guided by several factors, including, but not limited to: the analytical results of samples either directly or indirectly associated with the waste, historical site knowledge, knowledge of the waste generation process, field observations, and/or field-monitoring/screening results.

Onsite IDW management requirements by waste type are detailed in the following sections. Applicable waste management regulations and requirements are listed in Table 5-1.

5.3.1 Sanitary Waste

Sanitary IDW generated at each UR will be collected, managed, and disposed of in accordance with the sanitary waste management regulations and permits for operation of the NTS 10c Industrial Waste Landfill.

Table 5-1
Waste Management Regulations and Requirements

Waste Type	Federal Regulation	Additional Requirements
Solid (nonhazardous)	N/A	NRS[a] 444.440 - 444.620 NAC[b] 444.570 - 444.7499 NTS Landfill Permit SW13.097.04[c] NTS Landfill Permit SW13.097.03[d]
Liquid/Rinsate (nonhazardous)	N/A	Water Pollution Control General Permit GNEV93001, Rev. 3iii[e]
Hazardous	RCRA[f], 40 CFR 260-282	NRS[a] 459.400 - 459.600 NAC[b] 444.850 - 444.8746 POC[g]
Low-Level Radioactive	N/A	DOE Orders and NTSWAC[h]
Mixed	RCRA[f], 40 CFR 260-282	NTSWAC[h] POC[g]
Hydrocarbon	N/A	NTS Landfill Permit SW13.097.02[i]
Polychlorinated Biphenyls	TSCA[j], 40 CFR 761	NRS[a] 459.400 - 459.600 NAC[b] 444.940 - 444.9555
Asbestos	TSCA[j], 40 CFR 763	NRS[a] 618.750 - 618.840 NAC[b] 444.965 - 444.976

[a]*Nevada Revised Statutes* (NRS, 1997) (NRS, 2007b)
[b]*Nevada Administrative Code* (NAC, 2006a)
[c]Area 23 Class II Solid Waste Disposal Site (NDEP, 1997a)
[d]Area 9 Class III Solid Waste Disposal Site (NDEP, 1997c)
[e]Nevada Test Site Sewage Lagoons (NDEP, 1999)
[f]*Resource Conservation and Recovery Act* (CFR, 2007a)
[g]*Nevada Test Site Performance Objective for the Certification of Nonradioactive Hazardous Waste* (BN, 1995)
[h]*Nevada Test Site Waste Acceptance Criteria,* Rev. 6-02 (NNSA/NSO, 2006b)
[i]Area 6 Class III Solid Waste Disposal Site for hydrocarbon waste (NDEP, 1997b)
[j]*Toxic Substance Control Act* (CFR, 2007b and c)

CFR = *Code of Federal Regulations*
DOE = U.S. Department of Energy
N/A = Not applicable
NAC = *Nevada Administrative Code*
NRS = *Nevada Revised Statutes*
NTS = Nevada Test Site
NTSWAC = *Nevada Test Site Waste Acceptance Criteria*
POC = Performance Objective for the Certification of Nonradioactive Hazardous Waste
RCRA = *Resource Conservation and Recovery Act*
TSCA = *Toxic Substance Control Act*

Sanitary IDW generated at each UR will only be collected in plastic bags, sealed, labeled with the UR number from each site from which it was generated, and dated. The waste will then be placed in a roll-off box in Mercury, or other approved roll-off box location. The number of bags of sanitary IDW

placed in the roll-off box will be counted as they are placed in the roll-off box, noted in a log, and documented in the Field Activity Daily Log. These logs will provide necessary tracking information for ultimate disposal in the 10c Industrial Waste Landfill.

5.3.2 Hazardous Waste

The supplemental investigation will have waste accumulation areas established according to the needs of the project. Satellite accumulation areas and HWAAs will be managed consistent with the requirements of federal and state regulations (CFR, 2007a; NAC, 2006b). The HWAAs will be properly controlled for access, and will be equipped with spill kits and appropriate spill containment. Suspected hazardous wastes will be placed in DOT-compliant containers. All containerized hazardous waste will be handled, inspected, and managed in accordance with Title 40 *Code of Federal Regulations* (CFR) 265 Subpart I (CFR, 2007a). These provisions include managing the waste in containers compatible with the waste type, and segregating incompatible waste types so that in the event of a spill, leak, or release, incompatible wastes shall not contact one another. The HWAAs will be covered under a site-specific emergency response and contingency action plan until such time that the waste is determined to be nonhazardous, or all containers of hazardous waste have been removed from the storage area. Hazardous waste will be characterized in accordance with the requirement of Title 40 CFR 261 (CFR, 2007a). *Resource Conservation and Recovery Act* -"listed" waste has not been identified for any of the URs. Waste that is determined to be hazardous will be managed and transported to a permitted treatment, storage, and disposal facility in accordance with RCRA and DOT requirements (CFR, 2007a).

5.3.3 Hydrocarbon Waste

Hydrocarbon soil waste containing more than 100 mg/kg of TPH will be managed onsite in a drum or other appropriate container until fully characterized. Hydrocarbon waste may be disposed of at a designated hydrocarbon landfill (NDEP, 1997b), an appropriate hydrocarbon waste management facility (e.g., recycling facility), or other method in accordance with Nevada regulations.

5.4 Management of Specific Waste Streams

5.4.1 Personal Protective Equipment

Personal protective equipment and disposable sampling equipment will be visually inspected for stains, discoloration, and gross contamination as the waste is generated; and evaluated for radiological contamination. Staining and/discoloration will be assumed to be the result of contact with potentially contaminated media such as soil, sludge, or liquid. Gross contamination is the visible contamination of an item (e.g., clumps of soil/sludge on a sampling spoon or free liquid smeared on a glove). While gross contamination can often be removed through decontamination methods, removal of gross contamination from small items, such as gloves or booties is not typically conducted. Any IDW that meets this description will be segregated and managed as potentially "characteristic" hazardous waste. This segregated population of waste will be either: (1) assigned the characterization of the soil/sludge that was sampled, (2) sampled directly, or (3) undergo further evaluation using the soil/sludge sample results to determine how much soil/sludge would need to be present in the waste to exceed regulatory levels. The PPE and equipment that is not visibly stained, discolored, or grossly contaminated will be managed as nonhazardous sanitary waste.

5.4.2 Management of Decontamination Rinsate

Decontamination rinsate that is potentially hazardous (using associated sample results and/or process knowledge) will be managed as characteristic hazardous waste (CFR, 2007a). The regulatory status of the potentially hazardous rinsate will be determined through the application of associated sample results or direct sampling. If the associated samples do not indicate the presence of hazardous constituents, then the rinsate will be considered to be nonhazardous.

The disposal of nonhazardous rinsate will be consistent with guidance established in current NNSA/NSO Fluid Management Plans for the NTS as follows:

- Rinsate that is determined to be nonhazardous and contaminated to less than 5x Safe Drinking Water Standards (SDWS) is not restricted as to disposal. Nonhazardous rinsate that is contaminated at 5x to 10x SDWS will be disposed of in an established infiltration basin or solidified and disposed of as sanitary waste or low-level waste in accordance with the respective sections of this document.

- Nonhazardous rinsate that is contaminated at greater than 10x SDWS will be disposed of in a lined basin or solidified, and disposed of as sanitary waste or low-level waste, in accordance with the respective sections of this document.

6.0 Quality Assurance/Quality Control

The overall objective of the characterization activities described in this SIP is to collect accurate and defensible data to support the evaluation of existing URs against the current IS RBCA process and potentially modify the existing URs. Sections 6.1 and 6.2 discuss the collection of required QC samples in the field and QA requirements for laboratory/analytical data to achieve closure. Unless otherwise stated in this SIP, or required by the results of the DQO process (Appendix A), this investigation will adhere to the IS QAPP (NNSA/NV, 2002b).

6.1 Quality Control Sampling Activities

Field QC samples will be collected in accordance with established procedures. Field QC samples are collected and analyzed to aid in determining the validity of environmental sample results. The number of required QC samples depends on the types and number of environmental samples collected. The minimum frequency of collecting and analyzing QC samples for this investigation, as determined in the DQO process, include:

- Trip blanks (1 per sample cooler containing VOC environmental samples)
- Equipment rinsate blanks (1 per sampling event)
- Source blanks (1 per lot of uncharacterized source material)
- Field duplicates (1 per 20 environmental samples)
- Laboratory QC samples (1 per 20 environmental samples)

Additional QC samples may be submitted based on site conditions at the discretion of the Task Manager or Site Supervisor. Field QC samples shall be analyzed using the same analytical procedures implemented for associated environmental samples. Additional details regarding field QC samples are available in the IS QAPP (NNSA/NV, 2002b).

6.2 Laboratory/Analytical Quality Assurance

Criteria for the investigation, as stated in the DQOs (Appendix A) and except where noted, require laboratory analytical quality data be used for making critical decisions. Rigorous QA/QC will be implemented for all laboratory samples including documentation, data verification and validation of analytical results, and an assessment of DQIs as they relate to laboratory analysis.

6.2.1 Data Validation

Data verification and validation will be performed in accordance with the IS QAPP (NNSA/NV, 2002b), except where otherwise stipulated in this SIP. All laboratory data from samples that are collected and analyzed will be evaluated for data quality according to company-specific procedures. The data will be reviewed to ensure that all suspected samples were appropriately collected, analyzed, and the results passed data validation criteria. Validated data, including estimated data (i.e., J-qualified), will be assessed to determine whether they meet the DQO requirements of the investigation and the performance criteria for the DQIs. The results of this assessment will be documented in the investigation report. If the DQOs were not met, corrective actions will be evaluated, selected, and implemented (e.g., refine CSM or resample to fill data gaps).

6.2.2 Data Quality Indicators

The DQIs are qualitative and quantitative descriptors used in interpreting the degree of acceptability or utility of data. Data quality indicators are used to evaluate the entire measurement system and laboratory measurement processes (i.e., analytical method performance) as well as to evaluate individual analytical results (i.e., parameter performance). The quality and usability of data to make DQO decisions will be assessed based on the following DQIs:

- Precision
- Accuracy/bias
- Representativeness
- Comparability
- Completeness
- Sensitivity

Table 6-1 provides the established analytical method/measurement system performance criteria for each of the DQIs and the potential impacts to the decision if the criteria are not met. The following subsections discuss each of the DQIs that will be used to assess the quality of laboratory data. Due to changes in analytical methodology and changes in analytical laboratory contracts, criteria for precision and accuracy in Table 3-2 that vary from corresponding information in the QAPP will supersede the QAPP (NNSA/NV, 2002b).

Table 6-1
Laboratory and Analytical Performance Criteria for UR Data Quality Indicators

Data Quality Indicator	Performance Metric	Potential Impact on Decision If Performance Metric Not Met
Precision	At least 80% of the sample results for each measured contaminant are not qualified for precision based on the criteria for each analytical method-specific and laboratory-specific criteria presented in Section 6.2.3.	If the performance metric is not met, the affected analytical results from each affected UR will be assessed to determine whether there is sufficient confidence in analytical results to use the data in making DQO decisions.
Accuracy/bias	At least 80% of the sample results for each measured contaminant are not qualified for accuracy based on the method-specific and laboratory-specific criteria presented in Section 6.2.4.	If the performance metric is not met, the affected analytical results from each affected UR will be assessed to determine whether there is sufficient confidence in analytical results to use the data in making DQO decisions.
Sensitivity	Minimum detectable concentrations are less than or equal to respective FALs.	Cannot determine whether COCs are present at levels of concern.
Comparability	Sampling, handling, preparation, analysis, reporting, and data validation are performed using standard methods and procedures.	Inability to combine data with data obtained from other sources and/or inability to compare data to regulatory action levels.
Representativeness	Samples contain contaminants at concentrations present in the environmental media from which they were collected.	Analytical results will not represent true site conditions. Inability to make appropriate DQO decisions.
Completeness	80% of the UR-specific COPCs have valid results. 100% of UR-specific targeted contaminants have valid results.	Cannot support/defend decision on whether COCs are present.

COC = Contaminant of concern
COPC = Contaminant of potential concern
DQO = Data quality objective
FAL = Final action level

6.2.3 Precision

Precision is a measure of the repeatability of the analysis process from sample collection through analysis results. It is used to assess the variability between two equal samples.

Determinations of precision will be made for field duplicate samples and laboratory duplicate samples. Field duplicate samples will be collected simultaneously, with samples from the same source under similar conditions, in separate containers. The duplicate sample will be treated independently of the original sample in order to assess field impacts and laboratory performance on

precision through a comparison of results. Laboratory precision is evaluated as part of the required laboratory internal QC program to assess performance of analytical procedures. The laboratory sample duplicates are an aliquot, or subset, of a field sample generated in the laboratory. They are not separate samples but a split, or portion, of an existing sample. Typically, laboratory duplicate QC samples may include matrix spike duplicate (MSD) and laboratory control sample (LCS) duplicate samples for organic, inorganic, and radiological analyses.

Precision is a quantitative measure used to assess overall analytical method and field-sampling performance as well as to assess the need to "flag" (qualify) individual parameter results when corresponding QC sample results are not within established control limits.

The criteria for the assessment of organic chemical precision is based on professional judgment using laboratory derived control limits.

Any values outside the specified criteria do not necessarily result in the qualification of analytical data. It is only one factor in making an overall judgment about the quality of the reported analytical results. The performance metric for assessing the DQI of precision on DQO decisions (see Table 6-1) is that at least 80 percent of sample results for each measured contaminant are not qualified due to duplicates exceeding the criteria. If this performance is not met, an assessment will be conducted on the impacts to DQO decisions specific to affected contaminants and URs and documented in the investigation report.

6.2.4 Accuracy

Accuracy is a measure of the closeness of an individual measurement to the true value. It is used to assess the performance of laboratory measurement processes.

Accuracy is determined by analyzing a reference material of known parameter concentration or re-analyzing a sample to which a material of known concentration or amount of parameter has been added (spiked). Accuracy will be evaluated based on results from three types of spiked samples: matrix spike (MS), LCS, and surrogates (organics). The LCS is analyzed with the field samples using the same sample preparation, reagents, and analytical methods employed for the samples. One LCS will be prepared with each batch of samples for analysis by a specific measurement.

For the assessment of accuracy, MS and LCS laboratory-specific percent recovery criteria developed and generated in-house by the laboratory are applied, according to approved laboratory procedures.

Any values outside the specified criteria do not necessarily result in the qualification of analytical data. It is only one factor in making an overall judgment about the quality of the reported analytical results. Factors beyond laboratory control, such as sample matrix effects, can cause the measured values to be outside of the established criteria. Therefore, the entire sampling and analytical process may be evaluated when determining the usability of the affected data.

The performance metric for assessing the DQI of accuracy on DQO decisions (see Table 6-1) is that at least 80 percent of the sample results for each measured contaminant are not qualified for accuracy. If this performance is not met, an assessment will be conducted on the impacts to DQO decisions specific to affected contaminants and URs and documented in the investigation report.

6.2.5 Representativeness

Representativeness is the degree to which sample characteristics accurately and precisely represent a characteristics of a population or an environmental condition (EPA, 2002). Representativeness is assured by carefully developing the sampling strategy during the DQO process such that false negative and false positive decision errors are minimized. The criteria listed in DQO Step 6 – Specify the Tolerable Limits on Decision Errors are:

- Having a high degree of confidence that the sample locations selected will identify COCs, if present within the UR.
- Having a high degree of confidence that analyses conducted will be sufficient to detect any COCs present in the samples.

These are qualitative measures that will be used to assess measurement system performance for representativeness. The assessment of this qualitative criterion will be presented in the investigation report.

6.2.6 Completeness

Completeness is defined as generating sufficient data of the appropriate quality to satisfy the data needs identified in the DQOs. Completeness will be evaluated using both a quantitative measure and

a qualitative assessment. The quantitative measurement to be used to evaluate completeness is presented in Table 6-1 and based on the percentage of measurements made that are judged to be valid.

The completeness goal for targeted contaminants and the remaining COPCs is 100 and 80 percent, respectively. If this goal is not achieved, the dataset will be assessed for potential impacts on making DQO decisions.

The qualitative assessment of completeness is an evaluation of the sufficiency of information available to make DQO decisions. This assessment will be based on meeting the data needs identified in the DQOs and presented in the investigation report. Additional samples will be collected if the number of samples do not meet completeness criteria.

6.2.7 Comparability

Comparability is a qualitative parameter expressing the confidence with which one dataset can be compared to another (EPA, 2002). The criteria for the evaluation of comparability will be that sampling, handling, preparation, analysis, reporting, and data validation was performed and documented in accordance with approved procedures that are in conformance with standard industry practices. Analytical methods and procedures approved by DOE will be used to analyze, report, and validate the data. These methods and procedures are in conformance with applicable methods used in industry and government practices. An evaluation of comparability will be presented in the investigation report.

6.2.8 Sensitivity

Sensitivity is the capability of a method or instrument to discriminate between measurement responses that represents different levels of variable of interest (EPA, 2002). The evaluation criteria for this parameter will be that measurement sensitivity (detection limits) will be less than or equal to the corresponding FALs. If this criterion is not achieved, the affected data will be assessed for usability and potential impacts on meeting site characterization objectives. This assessment will be presented in the investigation report.

7.0 Duration and Records Availability

7.1 Duration

Table 7-1 is a tentative duration (in calendar days) for supplemental investigation activities.

Table 7-1
Investigation Activity Durations

Duration (days)	Activity
10	Site Preparation
76	Fieldwork Preparation and Mobilization
55	Sampling
160	Data Assessment
180	Waste Management

7.2 Records Availability

Historical information and documents referenced in this plan are retained in the NNSA/NSO project files in Las Vegas, Nevada, and can be obtained through written request to the NNSA/NSO Federal Sub-Project Director. This document is available in DOE public reading rooms located in Las Vegas and Carson City, Nevada. The NDEP maintains the official Administrative Record for all activities conducted under the auspices of the FFACO.

8.0 References

ASTM, see American Society for Testing and Materials.

American Society for Testing and Materials. 1995. *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites,* ASTM E 1739-95 (Reapproved 2002). Philadelphia, PA.

BN, see Bechtel Nevada.

Bechtel Nevada. 1995. *Nevada Test Site Performance Objective for Certification of Nonradioactive Hazardous Waste*, Rev. 0, G-E11/96.01. Las Vegas, NV.

CFR, see *Code of Federal Regulations.*

Code of Federal Regulations. 2007a. Title 40 CFR, Parts 260-282, "Hazardous Waste Management System: General." Washington, DC: U.S. Government Printing Office.

Code of Federal Regulations. 2007b. Title 40 CFR, Part 761, "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions." Washington, DC: U.S. Government Printing Office.

Code of Federal Regulations. 2007c. Title 40 CFR, Part 763, "Asbestos." Washington, DC: U.S. Government Printing Office.

DOE/NV, see U.S. Department of Energy, Nevada Operations Office.

DRI, see Desert Research Institute.

Desert Research Institute. 1988. *CERCLA Preliminary Assessment of DOE's Nevada Operations Office, Nuclear Weapons Testing Areas.* April. Las Vegas, NV.

EPA, see U.S. Environmental Protection Agency.

ERDA, see U.S. Energy Research and Development Administration.

FFACO, see *Federal Facility Agreement and Consent Order.*

Federal Facility Agreement and Consent Order. 1996 (as amended). Agreed to by the State of Nevada; U.S. Department of Energy, Environmental Management; U.S. Department of Defense; and U.S. Department of Energy, Legacy Management.

Lockheed Martin Energy Systems, Inc. 1998. *Environmental Compliance Program, Final UST Remedial Action Report: Phase 2 Offbase Excavate and Remove Sites*. Hazardous Waste Remedial Actions Program. Prepared for the U.S. Department of Energy, Contract DE-AC05-84OR21400. July. Edwards Air Force Base, CA.

Maize, T, Bureau of Federal Facilities. 2004. Letter to J. L. Appenzeller-Wing (NNSA/NSO), entitled, "Approval of Mobility Study Recommendations, Corrective Action Unit 339: Area 12 Fleet Operations, Steam Cleaning Discharge Area, Nevada Test Site, NV, Federal Facility Agreement and Consent Order (FFACO)." 14 April. Las Vegas, NV.

NAC, see *Nevada Administrative Code*.

NDEP, see Nevada Division of Environmental Protection.

NNSA/NSO, see U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office.

NNSA/NV, see U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office.

NRS, see *Nevada Revised Statutes*.

Nevada Administrative Code. 2006a. NAC 444, "Sanitation." Carson City, NV. As accessed at http://www.leg.state.nv.us/nac on 13 December 2007.

Nevada Administrative Code. 2006b. NAC 445A.227, "Contamination of Soil: Order by Director for Corrective Action; Factors To Be Considered in Determining Whether Corrective Action Required." Carson City, NV. As accessed at http://www.leg.state.nv.us/nac on 13 December 2007.

Nevada Administrative Code. 2006c. NAC 445A.22705, "Contamination of Soil: Evaluation of Site by Owner or Operator; Review of Evaluation by Division." Carson City, NV. As accessed at http://www.leg.state.nv.us/nac on 13 December 2007.

Nevada Division of Environmental Protection. 1997a. *Class II Solid Waste Disposal Site for Municipal and Solid Waste, Area 23 of the NTS, Permit SW 13-097-04.* Carson City, NV.

Nevada Division of Environmental Protection. 1997b (as amended in August 2000). *Class III Solid Waste Disposal Site for Hydrocarbon Burdened Soils, Area 6 of the NTS*, Permit SW 13 097 02. Carson City, NV.

Nevada Division of Environmental Protection. 1997c (as amended in August 2000). *Class III Solid Waste Disposal Site; UIOC, Area 9 of the NTS*, Permit SW 13-097-03. Carson City, NV.

Nevada Division of Environmental Protection. 1999. *State of Nevada Water Pollution Control General Permit*, No. GNEV93001. Carson City, NV.

Nevada Revised Statutes. 1997. NRS 618.750 - 618.840, "Control of Asbestos." Carson City, NV.

Nevada Revised Statutes. 2007a. NRS 444.440 - 444.620, "Collection and Disposal of Solid Waste." Carson City, NV.

Nevada Revised Statutes. 2007b. NRS 459.400 - 459.600, "Disposal of Hazardous Waste." Carson City, NV.

SNJV GIS Systems, see Stoller-Navarro Joint Venture Geographic Information Systems.

Stoller-Navarro Joint Venture Geographic Information Systems. 2007. ESRI ArcGIS Software.

USGS, see U.S. Geological Survey.

U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office. 2001. *Streamlined Approach for Environmental Restoration Plan for Corrective Action Unit 326: Areas 6 and 27 Release Sites, Nevada Test Site, Nevada*, Rev. 0, DOE/NV--751. September. Las Vegas, NV.

U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office. 2002a. *Closure Report for Corrective Action Unit 326: Areas 6 and 27 Release Sites, Nevada Test Site, Nevada*, Rev. 1, DOE/NV--859-Rev 1. December. Las Vegas, NV.

U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office. 2002b. *Industrial Sites Quality Assurance Project Plan, Nevada Test Site, Nevada*, Rev. 3, DOE/NV--372. Las Vegas, NV.

U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office. 2003. *Streamlined Approach for Environmental Restoration Plan for Corrective Action Unit 358: Areas 18, 19, 20 Cellars/Mud Pits, Nevada Test Site, Nevada*, Rev. 1, DOE/NV--837-REV 1. February. Las Vegas, NV.

U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office. 2004a. *NV/YMP Radiological Control Manual*, Rev. 5, DOE/NV/11718-079. Prepared by Bechtel Nevada. Las Vegas, NV.

U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office. 2004b. *Closure Report for Corrective Action Unit 358: Areas 18, 19, 20 Cellars/Mud Pits, Nevada Test Site, Nevada*, Rev. 0, DOE/NV--944. January. Las Vegas, NV.

U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office. 2006a. *Industrial Sites Project Establishment of Final Action Levels,* Rev. 0, DOE/NV--1107. Las Vegas, NV.

U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office. 2006b. *Nevada Test Site Waste Acceptance Criteria,* Rev. 6-02, DOE/NV--325. Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office. 1996a. *Corrective Action Investigation Plan: The Second Gas Station Underground Storage Tanks,* Rev. 0, DOE/NV--426. May. Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office. 1996b. *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada,* DOE/EIS 0243. Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office. 1997a. *Closure Report for CAU 339: Area 12 Fleet Operations Steam-Cleaning Discharge Area, Nevada Test Site,* Rev. 0, DOE/NV/11718-167. December. Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office. 1997b. *Corrective Action Decision Document, Second Gas Station, Tonopah Test Range, Nevada (Corrective Action Unit No. 403),* Rev. 0, DOE/NV--471. March. Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office. 1997c. *Corrective Action Plan for CAU 339: Area 12 Fleet Operations Steam Cleaning Discharge Area, Nevada Test Site,* Rev. 0, DOE/NV/11718-106. May. Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office. 1997d. *Integrated Safety Management Policy,* DOE Order NV P 450.4. Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office. 1997e. *SAFER Work Plan for CAUs 452,454,456, and 464, Closure of Historical UST Release Sites Nevada Test Site,* Rev. 0, DOE/NV/11718-133. August. Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office. 1998a. *Closure Report for Corrective Action Unit 403: Second Gas Station, Tonopah Test Range, Nevada,* Rev. 0, DOE/NV/11718-207. September. Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office. 1998b. *Nevada Test Site Resource Management Plan.* DOE/NV--518, Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office. 1998c. *Streamlined Approach for Environmental Restoration Closure Report for Corrective Action Unit 452: Historical Underground Storage Tank Release Sites, Nevada Test Site, Nevada,* Rev. 0, DOE/NV/11718-209. April. Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office. 1998d. *Streamlined Approach for Environmental Restoration Closure Report for Corrective Action Unit 454: Historical Underground Storage Tank Release Sites, Nevada Test Site, Nevada*, Rev. 0, DOE/NV/11718-211. April. Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office. 1998e. *Streamlined Approach for Environmental Restoration Closure Report for Corrective Action Unit 464: Historical Underground Storage Tank Release Sites, Nevada Test Site, Nevada*, Rev. 0, DOE/NV/11718-212. April. Las Vegas, NV.

U.S. Energy Research and Development Administration. 1977. *Final Environmental Impact Statement, Nevada Test Site, Nye County, Nevada,* ERDA-1551, Washington, DC.

U.S. Environmental Protection Agency. 1996. *Test Method for Evaluating Solid Waste Physical/Chemical Methods*, SW-846, 3rd Edition. Washington, DC.

U.S. Environmental Protection Agency. 2002. *Guidance for Quality Assurance Project Plans,* EPA QA/G5. Washington, DC.

U.S. Environmental Protection Agency. 2004 (as revised). *Region 9 Preliminary Remediation Goals (PRGs).* As accessed at www.epa.gov/region09/waste/sfund/prg/htm on 4 September 2007.

U.S. Geological Survey. 1990. *Geologic Map of the Nevada Test Site, Southern Nevada,* USGS Map I-2046. Denver, CO.

Appendix A

Data Quality Objectives

A.1.0 Introduction

The DQO process described in this appendix is a seven-step strategic systematic planning method used to plan data collection activities and define performance criteria for the UR modification field investigation. The DQOs are designed to ensure that the data collected will provide sufficient and reliable information to evaluate and technically defend recommended modifications to current URs based on previous CAIs.

Many FFACO URs have been established at various CASs as part of FFACO corrective actions (FFACO, 1996; as amended January 2007). Since the signing of the FFACO in 1996, practices and procedures relating to the implementation of RBCA have evolved. Therefore, FFACO URs are being re-evaluated against the current RBCA criteria (referred to in this document as the IS RBCA process) as defined in the *Industrial Sites Project Establishment of Final Action Levels* (NNSA/NSO, 2006). This process conforms with NAC Section 445A.227 (NAC, 2006b) which lists the requirements for sites with soil contamination. For the evaluation of corrective actions, NAC Section 445A.22705 (NAC, 2006c) requires the use of ASTM Method E 1739 (ASTM, 1995) to "conduct an evaluation of the site, based on the risk it poses to public health and the environment, to determine the necessary remediation standards (i.e., FALs) or to establish that corrective action is not necessary."

All FFACO URs are established to protect site workers and the public from inadvertent contact with COCs. The COC identified for each UR addressed in this SIP is TPH. These URs were based exclusively on TPH-DRO and/or TPH-oil contamination exceeding 100 mg/kg.

Method E 1739-95 stipulates that risk evaluations for TPH contamination be calculated and evaluated based on the risk posed by the potentially hazardous constituents of TPH. Section 6.4.3 ("Use of Total Petroleum Hydrocarbon Measurements") of ASTM Method E 1739-95 states: "TPHs should not be used for risk assessment because the general measure of TPH provides insufficient information about the amounts of individual chemical(s) of concern present" (see also Sections X1.5.4 and X1.42 of Method E 1739-95 in ASTM, 1995). Therefore, the individual potentially hazardous constituents in TPH-DRO as listed in Table A.1-1 will be compared to their corresponding action levels to re-evaluate the need for each individual UR.

Table A.1-1
Hazardous Constituents of TPH-DRO

Common Name	PAL (mg/kg)
1,3,5-Trimethylbenzene	70
2-Methylnaphthalene	190
Anthracene	100,000
Benzo(a)anthracene	2.1
Benzene	1.4
Benzo(a)pyrene	0.21
Benzo(b)fluoranthene	2.1
Benzo(g,h,i)perylene	29,000
Benzo(k)fluoranthene	21
Chrysene	210
Ethylbenzene	400
Fluoranthene	22,000
Fluorene	26,000
Naphthalene	190
n-Butylbenzene	240
n-Propylbenzene	240
Phenanthrene	100,000
Pyrene	29,000
Toluene	520
Xylenes [a]	420

[a]Combination of o-, m-, and p-xylenes

mg/kg = Milligrams per kilogram
PAL = Preliminary action level

As the concentrations of potentially hazardous constituents of TPH present at the TPH-based URs addressed in this SIP is not known, a supplemental investigation will be conducted to collect this information. The information to establish the concentrations of potentially hazardous constituents of TPH will be provided by collecting samples from each UR and analyzing the samples using the VOC and SVOC analytical methods.

A.1.1 Modification Process

This evaluation will result in each UR being categorized into one of the following three categories:

1. No action. The risk posed by site contamination is controlled appropriately by the current UR.

2. Removal of the current UR. Contamination above FALs is not present at the site.

3. Modification of the current UR to appropriately control risks posed by the site.

All FFACO URs were established in an approved FFACO closure document (e.g., CADD/CR or CR). Changes to approved FFACO documents may take the form of an addendum, an errata sheet, or an ROTC. Addenda are used when extensive corrections/additions to a section or multiple sections of an FFACO document are necessary."

Approval of the subsequent UR SIR (similar to a CADD/CR) will constitute approval of the UR modifications recommended for each UR. Following approval of the UR SIR, an addendum to each associated closure document (that originally established each UR) will be prepared and submitted as NNSA/NSO FFACO records. These addenda will consist of:

- A cover page that will refer the reader to the UR SIR for additional information.
- The cover and signature pages of the UR SIR.
- The NDEP approval letter of the UR SIR.
- The corresponding section of the UR SIR.

As applicable, requirements for inspecting and maintaining the modified URs will be lifted, and the postings and signage at each site, specific to the FFACO UR, will be removed. Fencing and posting may be present at these sites that are unrelated to the FFACO UR, such as for radiological purposes, and are unrelated to the FFACO UR, as required by the *NV/YMP Radiological Control Manual* (NNSA/NSO, 2004a). Modification of any UR will not affect or modify non-FFACO requirements for fencing, posting, or monitoring at any of these sites. Investigations have been completed for the 12 URs addressed in this document (see Section 2.0) to establish that TPH is the only contaminant present at levels of potential concern at each site, and the extent of TPH contamination at each site has been determined to define the extent of each UR. As the CASs associated with the URs addressed in this SIP have already been characterized, the investigations described in this SIP will be limited to collecting the needed concentrations of potentially hazardous constituents of TPH from the areas

previously defined as containing the highest concentration of TPH. Based on the results from the previous investigations at these sites, each UR is assumed to meet the following criteria:

- The size and depth of the TPH plume has been adequately defined.
- No contaminants other than TPH were identified as COCs.
- Areas with the highest TPH contamination are either well documented and/or biasing factors exist to ensure that sampling is conducted in the areas where maximum concentrations are expected.

The underlying assumption for the re-evaluation of URs addressed in this document is that contamination at these sites have been identified and that the original CSMs are valid. Should the field investigations produce information that contradicts this underlying assumption, NDEP will be notified and an appropriate path forward will be developed.

Also included in Section A.2.0 are the recommended modifications to each UR. Each site is addressed in Sections A.2.1 through A.2.12 to include the following information:

- The CAS description as listed in the FFACO database.
- Current UR description as listed in the corresponding FFACO closure document.
- Basis for current UR as listed in the corresponding FFACO closure document including the analytical results driving the decision.

The UR investigations will be based on the DQOs presented in this appendix as developed by representatives of the NDEP and NNSA/NSO. The seven steps of the DQO process presented in Sections A.3.0 through A.9.0 were developed in accordance with *EPA Guidance on Systematic Planning Using the Data Quality Objectives Process* (EPA, 2006).

The DQO process presents a judgmental sampling approach. In general, the procedures used in the DQO process provide:

- A method to establish performance or acceptance criteria, which serve as the basis for designing a plan for collecting data of sufficient quality and quantity to support the goals of a study.

- Criteria that will be used to establish the final data collection design such as the:

  - Nature of the problem that has initiated the study and a conceptual model of the environmental hazard to be investigated.

  - Decisions or estimates that need to be made and the order of priority for resolving them.

  - Type of data needed.

  - Analytical approach or decision rule that defines the logic for how the data will be used to draw conclusions from the study findings.

- Acceptable quantitative criteria on the quality and quantity of the data to be collected, relative to the ultimate use of the data.

- A data collection design that will generate data meeting the quantitative and qualitative criteria specified. A data collection design specifies the type, number, location, and physical quantity of samples and data, as well as the QA and QC activities to ensure that sampling design and measurement errors are managed sufficiently to meet the performance or acceptance criteria specified in the DQOs.

A.2.0 Background Information

The 12 URs listed in Table A.2-1 are located in Areas 2, 6, 12, 19, 25, and 29 of the NTS, and Area 3 of the TTR, as shown in Figures A.2-1 and A.2-2. Previous investigations for the CASs are also provided.

Table A.2-1
Previous Investigations
(Page 1 of 2)

CAU	UR	Previous Investigation Report
326	06-25-01, CP-1 Heating Oil Release 06-25-02, UST Release	U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office. 2001. *Streamlined Approach for Environmental Restoration Plan for Corrective Action Unit 326: Areas 6 and 27 Release Sites, Nevada Test Site, Nevada,* Rev. 0, DOE/NV--751. September. Las Vegas, NV. U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office. 2002. *Closure Report for Corrective Action Unit 326: Areas 6 and 27 Release Sites, Nevada Test Site, Nevada*, Rev. 1, DOE/NV--859-Rev 1. December. Las Vegas, NV.
339	12-19-01, A12 Fleet Ops Steam Cleaning Efflu.	U.S. Department of Energy, Nevada Operations Office. 1997. *Corrective Action Plan for CAU 339: Area 12 Fleet Operations Steam Cleaning Discharge Area, Nevada Test Site*, Rev. 0, DOE/NV/11718-106. May. Las Vegas, NV. U.S. Department of Energy, Nevada Operations Office. 1997. *Closure Report for CAU 339: Area 12 Fleet Operations Steam-Cleaning Discharge Area, Nevada Test Site*, Rev. 0, DOE/NV/11718-167. December. Las Vegas, NV.
358	19-09-05, Mud Pit	U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office. 2003. *Streamlined Approach for Environmental Restoration Plan for Corrective Action Unit 358: Areas 18, 19, 20 Cellars/Mud Pits, Nevada Test Site, Nevada*, Rev. 1, DOE/NV--837-REV 1. February. Las Vegas, NV. U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office. 2004. *Closure Report for Corrective Action Unit 358: Areas 18, 19, 20 Cellars/Mud Pits, Nevada Test Site, Nevada*, Rev. 0, DOE/NV--944. January. Las Vegas, NV.
403	03-02-004-0360, Underground Storage Tanks	U.S. Department of Energy, Nevada Operations Office. 1996. *Corrective Action Investigation Plan: The Second Gas Station Underground Storage Tanks*, Rev. 0, DOE/NV--426. May. Las Vegas, NV. U.S. Department of Energy, Nevada Operations Office. 1997. *Corrective Action Decision Document, Second Gas Station, Tonopah Test Range, Nevada (Corrective Action Unit No. 403)*, Rev. 0, DOE/NV--471. March. Las Vegas, NV. U.S. Department of Energy, Nevada Operations Office. 1998. *Closure Report for Corrective Action Unit 403: Second Gas Station,Tonopah Test Range, Nevada*, Rev. 0, DOE/NV/11718-207. September. Las Vegas, NV.

Table A.2-1
Previous Investigations
(Page 2 of 2)

CAU	UR	Previous Investigation Report
452	25-25-09, Spill H940825C (from UST 25-3101-1)	U.S. Department of Energy, Nevada Operations Office. 1997. *SAFER Work Plan for CAUs 452,454,456, and 464, Closure of Historical UST Release Sites Nevada Test Site*, Rev. 0, DOE/NV/11718-133. August. Las Vegas, NV. U.S. Department of Energy, Nevada Operations Office. 1998. *Streamlined Approach for Environmental Restoration Closure Report for Corrective Action Unit 452: Historical Underground Storage Tank Release Sites, Nevada Test Site, Nevada*, Rev. 0, DOE/NV/11718-209. April. Las Vegas, NV.
	25-25-14, Spill H940314E (from UST 25-3102-3)	
	25-25-15, Spill H941020E (from UST 25-3152-1)	
454	12-25-08, Spill H950524F (from UST 12-B-1)	U.S. Department of Energy, Nevada Operations Office. 1997. *SAFER Work Plan for CAUs 452,454,456, and 464, Closure of Historical UST Release Sites Nevada Test Site*, Rev. 0, DOE/NV/11718-133. August. Las Vegas, NV. U.S. Department of Energy, Nevada Operations Office. 1998. *Streamlined Approach for Environmental Restoration Closure Report for Corrective Action Unit 454: Historical Underground Storage Tank Release Sites, Nevada Test Site, Nevada*, Rev. 0, DOE/NV/11718-211. April. Las Vegas, NV.
	12-25-10, Spill H950919A (from UST 12-COMM-1)	
464	02-02-03, UST 2-300-1	U.S. Department of Energy, Nevada Operations Office. 1997. *SAFER Work Plan for CAUs 452,454,456, and 464, Closure of Historical UST Release Sites Nevada Test Site*, Rev. 0, DOE/NV/11718-133. August. Las Vegas, NV. U.S. Department of Energy, Nevada Operations Office. 1998. *Streamlined Approach for Environmental Restoration Closure Report for Corrective Action Unit 464: Historical Underground Storage Tank Release Sites, Nevada Test Site, Nevada*, Rev. 0, DOE/NV/11718-212. April. Las Vegas, NV.
1010	PRL 454, Weathered Diesel Fuel	Lockheed Martin Energy Systems, Inc. 1998. *Environmental Compliance Program, Final UST Remedial Action Report: Phase 2 Offbase Excavate and Remove Sites. Hazardous Waste Remedial Actions Program*. Prepared for the U.S. Department of Energy, Contract DE-AC05-84OR21400. July. Edwards Air Force Base, CA.

CAU = Corrective Action Unit
SAFER = Streamlined Approach to Environmental Restoration
UR = Use restriction
UST = Underground storage tank

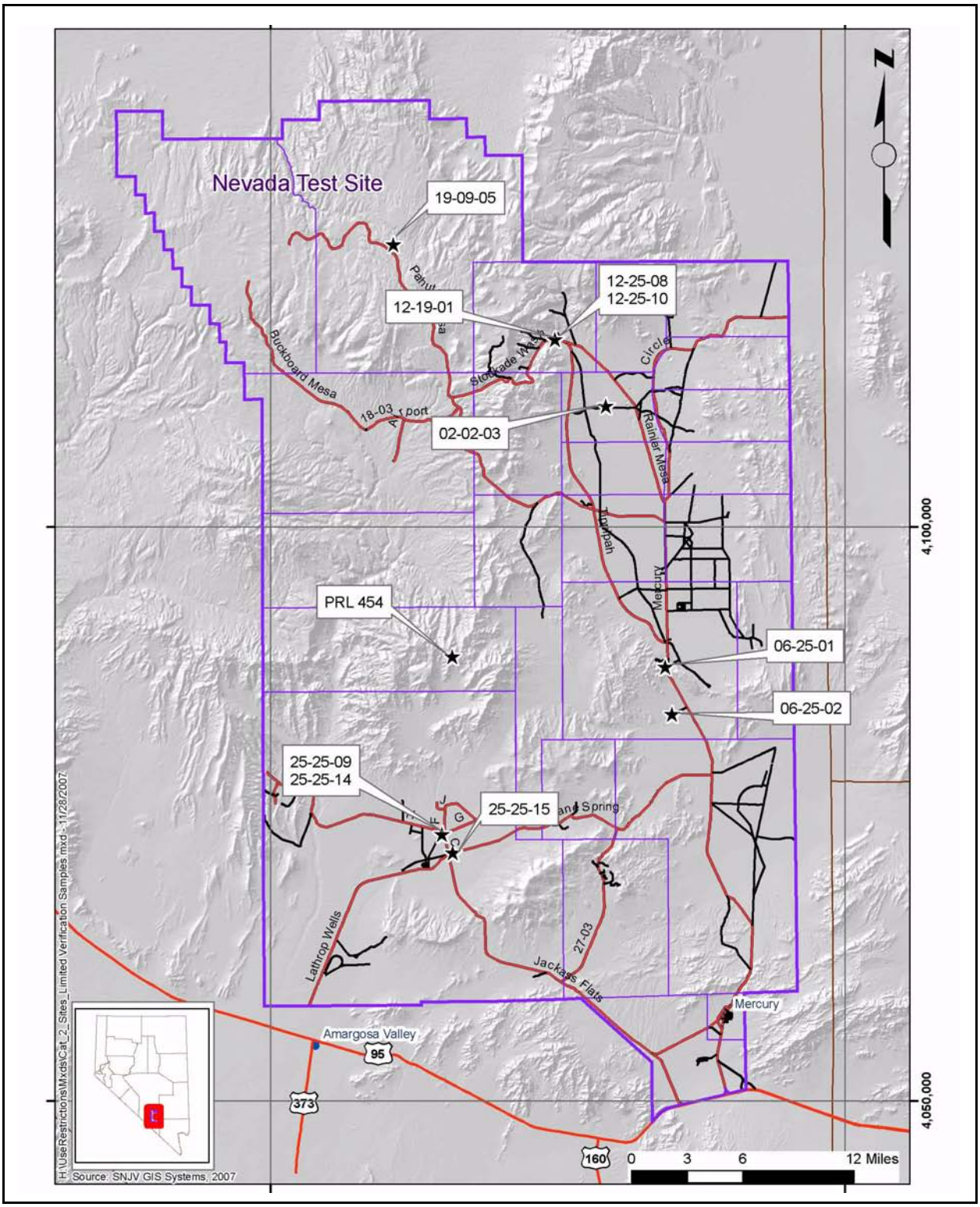

Figure A.2-1
Use Restriction Location Map on the Nevada Test Site

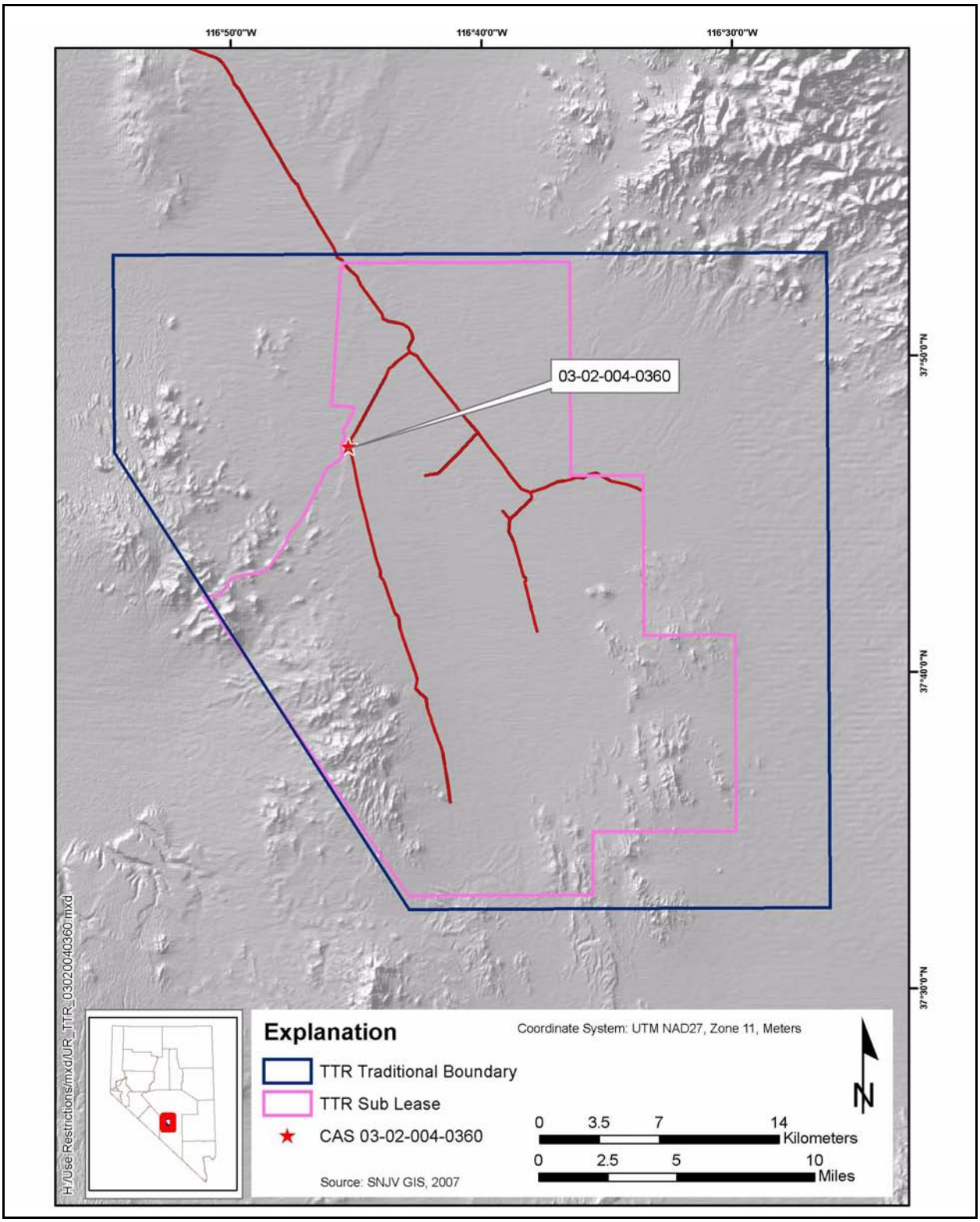

Figure A.2-2
Use Restriction Location Map on the Tonopah Test Range

Sections A.2.1 through A.2.12 provide a CAS description, current UR description, and basis for the current UR for each UR in CAUs 326, 339, 358, 403, 452, 454, 464, and 1010. The COPCs for this UR investigation are based on the TPH contamination previously identified during the initial CAI and closure activities. Targeted contaminants are defined as the individual hazardous constituents of TPH.

A.2.1 Use Restriction 06-25-01, CP-1 Heating Oil Release

Corrective Action Site 06-25-01 consists of a surface and subsurface heating oil release identified at Building CP-1 in Area 6. There is a UR in place at the site. Figure A.2-3 shows a site sketch of the UR.

Current Use Restriction Description – A UR is in place at the site due to TPH contamination. The UR, as recorded in the FFACO, states the future use of any land related to this CAU, as described by surveyed location, is restricted from any DOE or Air Force activity that may alter or modify the containment control as identified by the state and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance. Advance approval must be obtained from NNSA/NSO IS before subsurface activities at these locations, including routine maintenance, repair, or other activities. Use restrictions were implemented at three locations for this CAS around the original pipeline break in the Area 6 CP bus parking lot, at a segment of pipeline adjacent Building CP-1 and extending east over a utility corridor, around an exposed broken pipeline located between the Area 6 CP access road, and the south edge of the bus parking lot. There are no monitoring requirements associated with the UR (NNSA/NV, 2002a).

Basis for Current Use Restriction – A full description of previous investigations of CAS 06-25-01 is available in the CAU 326 CR. Samples taken from CAS 06-25-01 were analyzed for TPH, which was the only COC present. Levels of TPH exceeding the action level of 100 mg/kg were detected in 9 of 31 samples, and a UR was implemented. Table A.2-2 contains analytical results for soil samples at CAS 06-25-01 (NNSA/NV, 2002a).

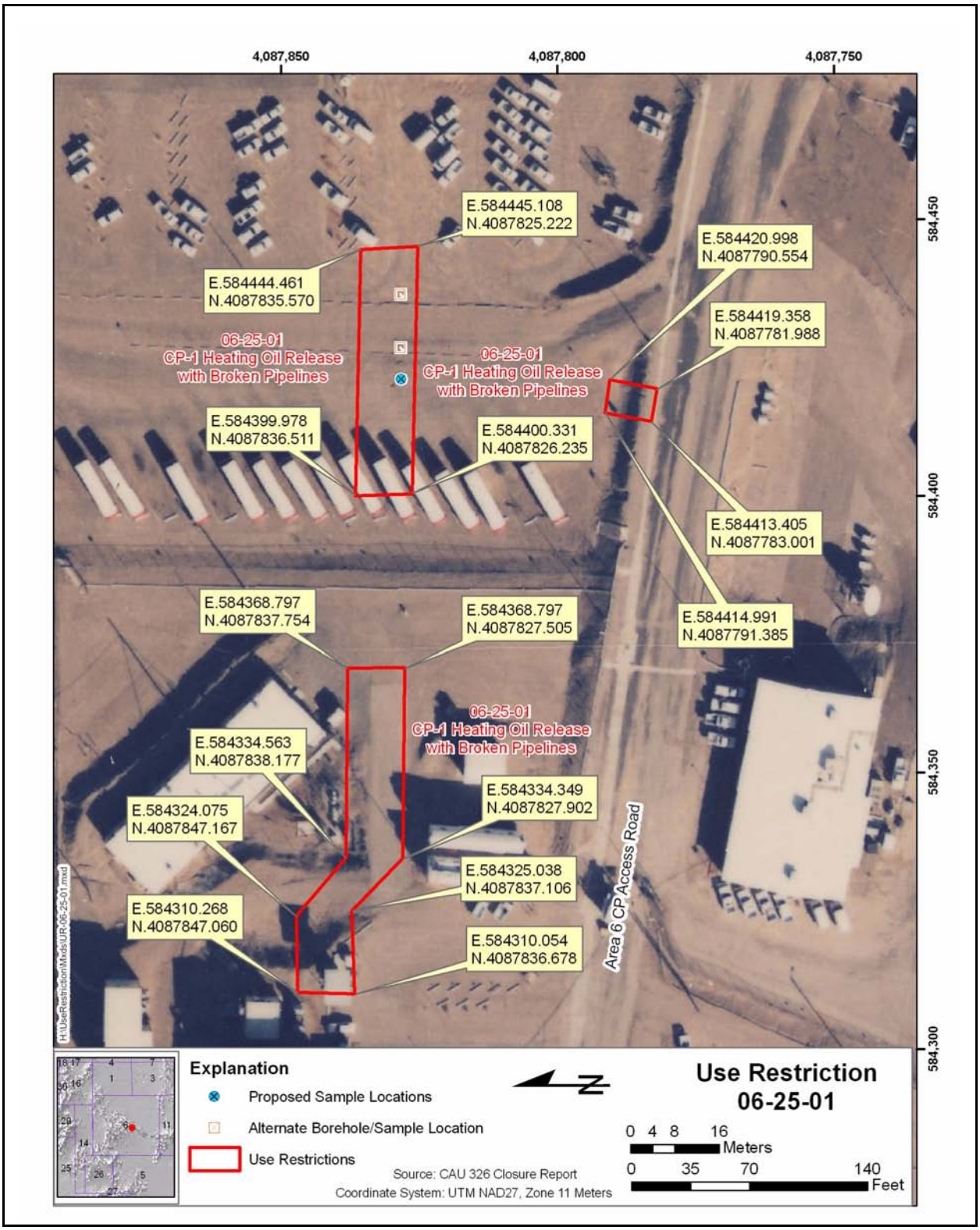

Figure A.2-3
Site Sketch of UR 06-25-01, CP-1 Heating Oil Release

Table A.2-2
Sample Results for CAS 06-25-01
(Page 1 of 2)

Sample Identification	Location	Depth (ft bgs)	TPH (mg/kg)
			Action Level 100 mg/kg
062501-01	Midpoint of west segment	2	61
062501-04	Center of excavation	2	84
062501-13	East pipeline segment	2	**1,500**
062501-13L	East pipeline segment	4	38
062501-22	East pipeline segment	2	**3,000**
062501-23	East pipeline segment	2	**220**
062501-23L	East pipeline segment	4	44
062501-24	East pipeline segment	2	**1,200**
062501-25	East pipeline segment	2	**9,000**
062501-26	West pipeline segment	2	89
326-B1-10	Borehole Number B1	10	**5,700**
326-B1-45	Borehole Number B1	45	**4,300**
326-B2-05	Borehole Number B2	5	**1,300**
326-B2-45	Borehole Number B2	45	ND
326-B2-50	Borehole Number B2	50	ND
326-B3-45	Borehole Number B3	45	ND
326-B3-50	Borehole Number B3	50	ND
326-B5-50	Borehole Number B5	50	ND
326-B7-10	Borehole Number B7	10	ND
326-B7-15	Borehole Number B7	15	ND
326-B7-75	Borehole Number B7	75	ND
326-B8-20	Borehole Number B8	20	ND
326-B9-30	Borehole Number B9	30	ND
Pipeline2	Surface grab from break	0	**11,000**
062501-S1	10 ft west of break	2	ND
062501-S4	3 ft south of break	2	**4,300**
062501-S5	10 ft north of break	2	ND

Table A.2-2
Sample Results for CAS 06-25-01
(Page 2 of 2)

Sample Identification	Location	Depth (ft bgs)	TPH (mg/kg)
			Action Level 100 mg/kg
062501-S6	20 ft east of break	2	ND
062501-S7	10 ft north of break	2	ND
062501-S8	20 ft north of break	2	ND
062501-S11	30 ft north of break	2	ND

Note: Bold text indicates value exceeding the action level.

bgs = Below ground surface
ft = Foot
mg/kg = Milligrams per kilogram
ND = Not detected
TPH = Total petroleum hydrocarbons

A.2.2 Use Restriction 06-25-02, UST Release

Corrective Action Site 06-25-02 consists of a surface hydrocarbon release that resulted from overfilling a heating oil tank located west of Building 500 at the DAF in Area 6. There is a UR in place. Figure A.2-4 shows a site sketch of the UR.

Current Use Restriction Description – A UR is in place at the site due to TPH contamination. The UR, as recorded in the FFACO, states the future use of any land related to this CAU, as described by surveyed location, is restricted from any DOE or Air Force activity that may alter or modify the containment control as identified by the state and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance. Advance approval must be obtained from NNSA/NSO IS before subsurface activities at these locations, including routine maintenance, repair, or other activities. The UR is for the area around the fill port. There are no monitoring requirements associated with the UR (NNSA/NV, 2002a).

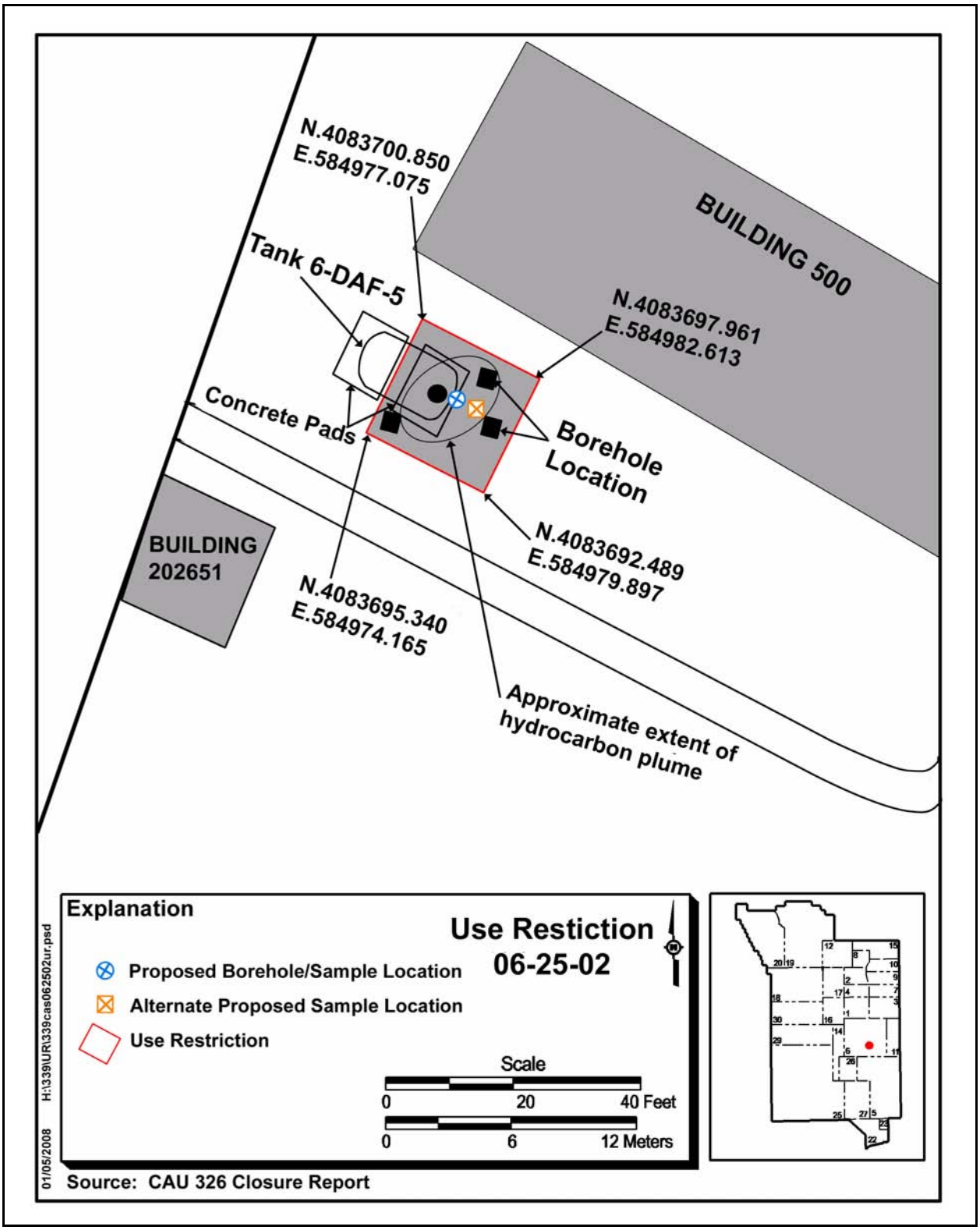

Figure A.2-4
Site Sketch of UR 06-25-02, UST Release

Basis for Current Use Restriction – A full description of previous investigations of CAS 06-25-02 is available in the CAU 326 CR. The area of the spill was excavated and two samples taken from the bottom of the excavation were analyzed for TPH as diesel. Table A.2-3 contains analytical results for these two soil samples from CAS 06-25-02 and additional samples taken from three boreholes surrounding the spill area. Levels of TPH diesel in the borehole samples were below the action level. Of the two samples taken from the bottom of the excavation, one had a TPH diesel level of 261 mg/kg, exceeding the action level of 100 mg/kg, which resulted in a UR (NNSA/NV, 2001).

Table A.2-3
Sample Results for CAS 06-25-02

Sample Identification	Location	Depth (ft bgs)	TPH as Diesel (mg/kg)
			Action Level 100 mg/kg
A5DAF318-1	East side of pad	0.5 - 1	**261**
A5DAF318-2	South side of pad	0.5 - 1	<10
DAF1-10	West corner of pad	10	<10
DAF1-20	West corner of pad	20	<10
DAF2-10	East corner of pad	10	<10
DAF2-20	East corner of pad	20	<10
DAF3-10	Approx 10 ft south of pad	10	<10
DAF3-20	Approx 10 ft south of pad	20	<10

Note: Bold text indicates value exceeding the action level.

bgs = Below ground surface
ft = Foot
mg/kg = Milligrams per kilogram
TPH = Total petroleum hydrocarbons
< = Less than

A.2.3 Use Restriction 12-19-01, A12 Fleet Ops Steam Cleaning Efflu.

Corrective Action Site 12-19-01 consists of a surface discharge from a sand/oil interceptor located at the former Area 12 Fleet Operations Building 12-16. There is a UR in place. Figure A.2-5 shows a site sketch of the UR.

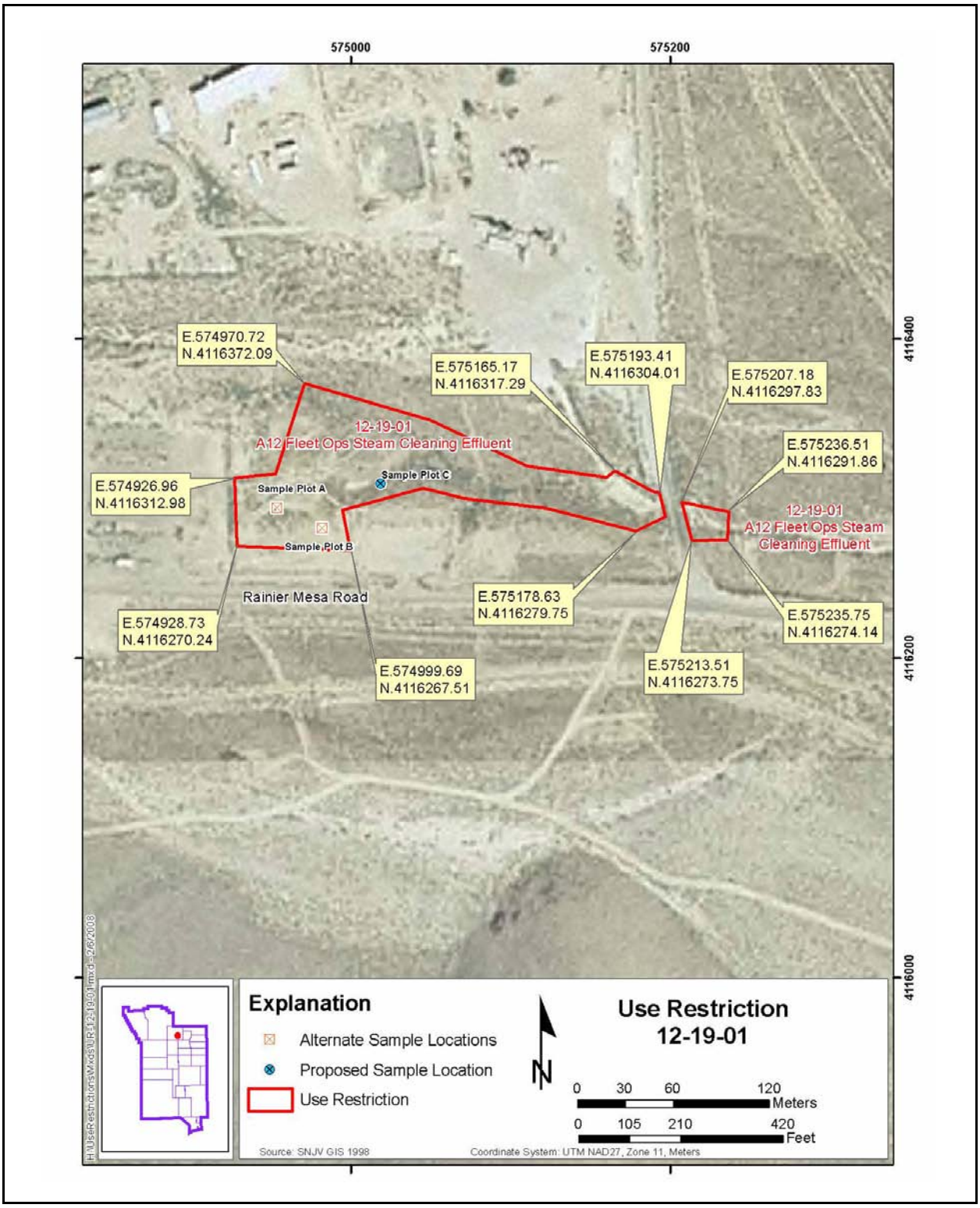

Figure A.2-5
Site Sketch of UR 12-19-01, A 12 Fleet Ops Steam Cleaning Efflu.

Current Use Restriction Description – A UR is in place at the site due to TPH contamination. The UR, as described in the FFACO, states the future use of any land related to this CAU, as described by surveyed location, is restricted from any activity that may alter or modify the containment control as identified by the state and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance. The UR area includes the initially impacted area as well as a wash area. Post-closure sampling requirements initially associated with the UR were removed in 2004, at this time the perimeter was fenced and signs were posted and annual monitoring to verify the signs are in place and legible was implemented (Maize, 2004).

Basis for Current Use Restriction – A full description of previous investigations of CAS 12-19-01 is available in the CAU 339 Corrective Action Plan. Samples were taken from 13 locations at CAS 12-19-01 and analyzed for TPH as oil and VOCs. Based on results from these analyses, TPH as oil is the only COC present at the site. Levels of TPH exceeding the action level of 100 mg/kg were reported at 9 of 13 sample areas, and a UR was implemented. Table A.2-4 contains analytical results of TPH as oil and VOCs at 13 sample locations at CAS 12-19-01 (DOE/NV, 1997c).

Table A.2-4
Sample Results for CAS 12-19-01
(Page 1 of 2)

Sample Area	TPH as Oil (mg/kg)	VOCs (mg/kg)
	Action Level 100 mg/kg	**Action Level**[a]
1	**3,400**	ND
2	**6,100**	ND
3	**830**	ND
4	ND	Acetone 0.110 Methylene Chloride 0.009B Toluene 0.004B
5	90	ND
6	**490**	ND
7	84	ND
8	**1,300**	ND

Table A.2-4
Sample Results for CAS 12-19-01
(Page 2 of 2)

Sample Area	TPH as Oil (mg/kg)	VOCs (mg/kg)
	Action Level 100 mg/kg	**Action Level**[a]
9[b]	**4,800**	Acetone 1.2 Methyl Ethyl Ketone 0.550 Methyl-isobutyl-ketone 0.061 2-Hexanone 0.360 Methylene Chloride 0.056B Toluene 0.024B
10[b]	ND	ND
11[a] (Phase 1 Duplicate of Sample Area 9)	**7,200**	Methylene Chloride 0.006 Methyl-isobutyl-ketone 0.010 2-Hexanone 0.012
12	**6,000**	Acetone 0.017B
13[a]	**8,600**	ND

[a]VOC Action Levels (Integrated Risk Information System [IRIS] soil action levels for Residential Land Use, August 1, 1996; proposed subpart S (55FR 30798):
[b]Based on review of excavation diagrams, this sample location appears to have been excavated and will not be considered during the current investigation.

Note: Bold text indicates value exceeding the action level.

Acetone - 2,100; 8,000
Methyl-ethyl-ketone (MEK) - 7,100; 4,000; 200 (TCLP [40 CFR 261.24] reported in mg/L)
Methyl-isobutyl-ketone (MIBK) - 770; 4,000
Toluene - 790; 20,000
Methylene Chloride - 7.8; 90

CFR = *Code of Federal Regulations*
mg/kg = Milligrams per kilograms
mg/L = Milligrams per liter
ND = Not detected
TCLP = Toxicity Characteristic Leaching Procedure
TPH = Total petroleum hydrocarbons
VOC = Volatile organic compound

B = Analyte was detected in blank as well as sample

A.2.4 Use Restriction 19-09-05, Mud Pit

Corrective Action Site 19-09-05 consists of TPH-contaminated drilling muds in a mud pit located in Area 19. There is a UR in place. Figure A.2-6 shows a site sketch of the UR.

Figure A.2-6
Site Sketch of UR 19-09-05, Mud Pit

Current Use Restriction Description – A UR is in place at the site due to TPH contamination. The UR, as recorded in the FFACO, states the future use of any land related to this CAU, as described by surveyed location, is restricted from any DOE or Air Force activity that may alter or modify the containment control as identified by the state and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance. T-posts mark the corner of the active use restriction area at CAS 19-09-05. There are no monitoring requirements associated with the UR (NNSA/NSO, 2004b).

Basis for Current Use Restriction – A full description of previous investigations of CAS 19-09-05 is available in the CAU 358 CR. Samples taken from CAS 19-09-05 were analyzed for VOCs, SVOCs, TPH full scan, PCBs, total RCRA metals, and gamma spectroscopy. Based on results from these analyses, TPH is the only COC present at the site. Levels of TPH exceeding the action level of 100 mg/kg were detected in four of four samples, and a UR was implemented. Table A.2-5 contains analytical results for soil samples at CAS 19-09-05 (NNSA/NSO, 2004b).

Table A.2-5
Sample Results for CAS 19-09-05

Sample Identification	Depth ft bgs	TPH Diesel (mg/kg)	TPH Oil (mg/kg)	TPH Gasoline (mg/kg)
		Action Level 100 mg/kg	Action Level 100 mg/kg	Action Level 100 mg/kg
190905-0-1MP	Surface	**138**	**970**	ND
190905-6-1MP	0.5	17	**150**	3.5
190905-0-2MP	Surface	15	**170**	3.2
190905-1-2MP	1.0	22	**170**	ND

Note: Bold text indicates value exceeding the action level.

bgs = Below ground surface
ft = Foot
mg/kg = Milligrams per kilogram
ND = Not detected
TPH = Total petroleum hydrocarbons

Although VOC and SVOC concentrations were reported to be below action levels, action levels and analytical results are not present in the initial investigation documentation. Therefore, this site is included in the current investigation.

A.2.5 Use Restriction 03-02-004-0360, Underground Storage Tanks

Corrective Action Site 03-02-004-0360 consists of subsurface hydrocarbon releases from two USTs formerly located at the Second Gas Station in Area 3 of the TTR. There is a UR in place. Figure A.2-7 shows a site sketch of the UR.

Current Use Restriction Description – A UR is in place at the site due to TPH contamination. The UR, as recorded in the FFACO, states the future use of any land related to this CAU, as described by surveyed location, is restricted from any DOE or Air Force activity that may alter or modify the containment control as identified by the state and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance. The Restricted Excavation Area begins at the eastern wall of Building 03-60 and extends eastward 45 ft east. Surface disturbances may be required for maintenance and repair purposes in the Restricted Excavation Area because subsurface utilities are present. In these cases, approval for excavation or surface disturbance will be provided by the Sandia National Laboratories Health and Safety Officer or designee. The Sandia National Laboratories Health and Safety Officer or designee will (within three weeks of the surface disturbance) inform DOE in writing of the purpose, time, and extent of the surface disturbance; surface restoration activities/modifications; and disposition of the excavated materials. Signs were posted identifying the site and restricting surface disturbances. There are no monitoring requirements associated with the UR (DOE/NV, 1998a).

Basis for Current Use Restriction – A full description of previous investigations of CAS 03-02-004-0360 is available in the CAU 403 CADD. Samples taken from 12 borings at CAS 03-02-004-0360 were analyzed for TPH diesel range, TPH gasoline range, and TC lead. Based on the results, TPH is the only COC present at the site. Levels of TPH exceeding the action level of 100 mg/kg were detected in 7 of 39 samples, and a UR was implemented. Table A.2-6 contains analytical results for soil samples with results exceeding detection limits at CAS 03-02-004-0360 (DOE/NV, 1997b).

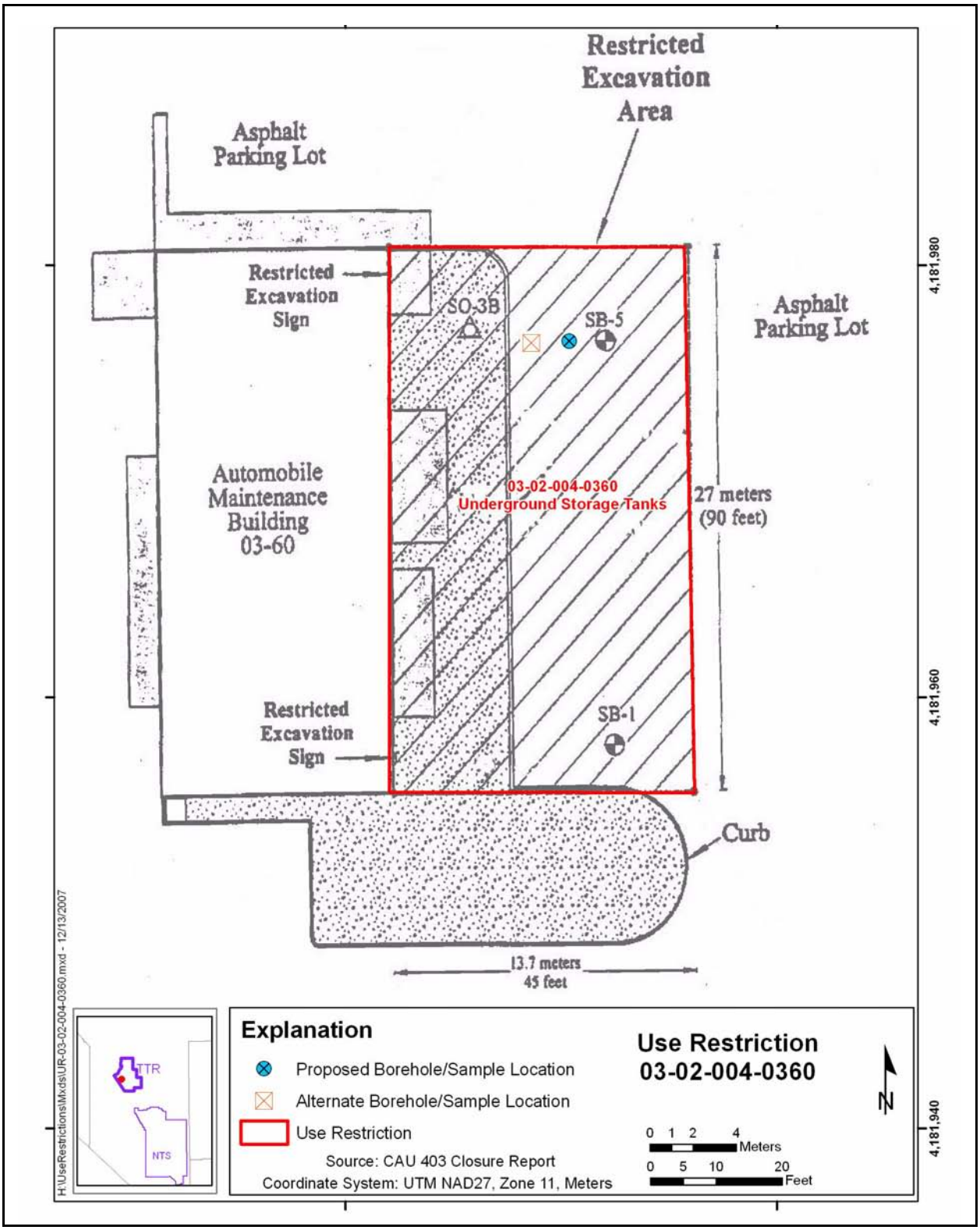

Figure A.2-7
Site Sketch of UR 03-02-004-0360, Underground Storage Tanks

Table A.2-6
Sample Results for CAS 03-02-004-0360

Sample Identification	Boring Identification	Depth (ft bgs)	TPH Diesel (mg/kg)	TPH Fuel Oil #2 (mg/kg)	TPH Gasoline (mg/kg)	TPH Waste Oil (mg/kg)
			Action Level 100 mg/kg	Action Level 100 mg/kg	Action Level 100 mg/kg	Action Level 100 mg/kg
TTR00121	SB-1	2	ND	**1,500**	ND	ND
TTR00124	SB-4	22	ND	**210**	1.2 (Y)	ND
TTR00152	SB-5	2	**120**	ND	ND	52
TTR00156	SB-5	12	**11,000**	ND	6.4 (Y)	ND
TTR00157	SB-5	12	**10,000**	ND	7.2 (Y)	ND
TTR00153	SB-5	22	**12,000**	ND	**150.0 (Y)**	ND
TTR00158	SO-3B	22	**5,300**	ND	8.6 (Y)	ND

Note: Bold text indicates value exceeding the action level.

bgs = Below ground surface
ft = Foot
mg/kg = Milligrams per kilogram
ND = Not detected
TPH = Total petroleum hydrocarbons
Y = The Gas Chromatograph pattern multipeaked but does not match gasoline

A.2.6 Use Restriction 25-25-09, Spill H940825C (from UST 25-3101-1)

Corrective Action Site 25-25-09 consists of a subsurface petroleum hydrocarbon release identified at UST 25-3101-1 located at Building 3101 in Area 25. There is a UR in place. Figure A.2-8 shows a site sketch of the UR.

Current Use Restriction Description – A UR is in place at the site due to TPH contamination. The UR, as described in the FFACO, states the future use of land related to this CAU, as described by surveyed location, is restricted from any activity that may alter or modify the containment control as identified by the state and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance. Monitoring requirements have not been identified for the site.

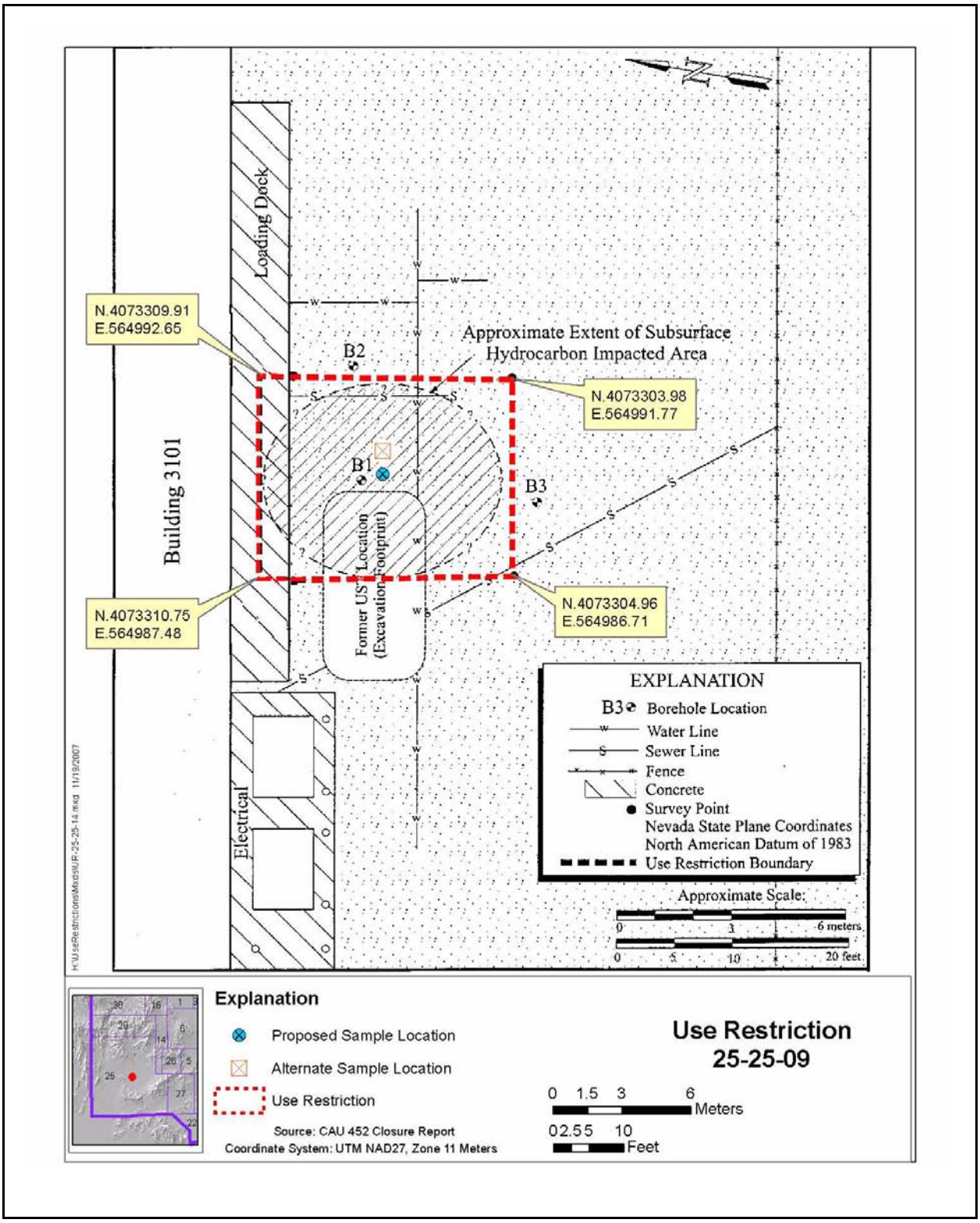

Figure A.2-8
Site Sketch of UR 25-25-09, Spill H940825C (from UST 25-3101-1)

Basis for Current Use Restriction – A full description of previous investigations of CAS 25-25-09 is available in the CAU 452 CR. The only COC present at the site is TPH. One sample collected during excavation at the east end of the tank bottom, at a depth of 9.5 ft bgs, had a TPH concentration of 2,400 mg/kg, exceeding the action level of 100 mg/kg. A second sample taken at a later date, at a depth of 12.5 ft bgs, had a TPH concentration of 544 mg/kg, exceeding the action level of 100 mg/kg. Additionally, 10 samples were taken from boreholes at CAS 25-25-09 and analyzed for TPH (gasoline, diesel, and oil). Of these samples, one from a depth of 20 ft bgs had a TPH diesel level of 420 mg/kg, exceeding the action level of 100 mg/kg, which resulted in a UR. Table A.2-7 contains analytical results for soil samples taken from boreholes at CAS 25-25-09 (DOE/NV, 1998b).

Table A.2-7
Sample Results for CAS 25-25-09

Borehole Identification	Sample ID	Depth (ft bgs)	TPH Gas (mg/kg)	TPH Diesel (mg/kg)	TPH Oil (mg/kg)
			Action Level 100 mg/kg	Action Level 100 mg/kg	Action Level 100 mg/kg
Borehole 1	3101/B1@20	20	NA	**420**	NA
Borehole 1	3101/B1@25	25	NA	<10	NA
Borehole 1	3101/B1@30	30	NA	<10	NA
Borehole 1	3101/B1@35	35	NA	<10	NA
Borehole 2	3101/B2@10	10	NA	<10	NA
Borehole 2	3101/B2@15	15	NA	<10	NA
Borehole 2	3101/B2@20	20	NA	<10	NA
Borehole 3	3101/B3@10	10	NA	<10	<50
Borehole 3	3101/B3@15	15	NA	<10	<50
Borehole 3	3101/B3@20	20	<10	<10	<50

Note: Bold text indicates value exceeding the action level.

bgs = Below ground surface
ft = Foot
mg/kg = Milligrams per kilogram
NA = Not analyzed
TPH = Total petroleum hydrocarbons
< = Less than

A.2.7 Use Restriction 25-25-14, Spill H940314E (from UST 25-3102-3)

Corrective Action Site 25-25-14 consists of a subsurface petroleum hydrocarbon release identified at UST 25-3102-3 located at Building 3102 in Area 25. There is a UR in place. Figure A.2-9 shows a site sketch of the UR.

Current Use Restriction Description– A UR is in place at the site due to TPH contamination. The UR, as described in the FFACO, states the future use of any land related to this CAU, as described by surveyed location, is restricted from any activity that may alter or modify the containment control as identified by the state and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance.

Basis for Current Use Restriction – A full description of previous investigations of CAS 25-25-14 is available in the CAU 452 CR. The only COC present at the site is TPH, and samples collected from a depth of 13 ft bgs, from the north and south end of the tank excavation, had TPH concentrations of 170 and 620 mg/kg, respectively, exceeding the action level of 100 mg/kg. Additionally, 10 samples were taken from boreholes at CAS 25-25-14 and analyzed for TPH (gasoline, diesel, and oil). Of these samples, one from a depth of 15 ft bgs had a TPH diesel level of 1,400 mg/kg, exceeding the action level of 100 mg/kg, which resulted in a UR. Table A.2-8 contains analytical results for soil samples taken from boreholes at CAS 25-25-14 (DOE/NV, 1998b).

A.2.8 Use Restriction 25-25-15, Spill H941020E (from UST 25-3152-1)

Corrective Action Site 25-25-15 consists of a subsurface petroleum hydrocarbon release identified at UST 25-3152-1 located at Building 3152 in Area 25. There is a UR in place. Figure A.2-10 shows a site sketch of the UR.

Current Use Restriction Description – A UR is in place at the site due to TPH contamination. The UR, as described in the FFACO, states the future use of any land related to this CAU, as described by surveyed location, is restricted from any activity that may alter or modify the containment control as identified by the state and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance.

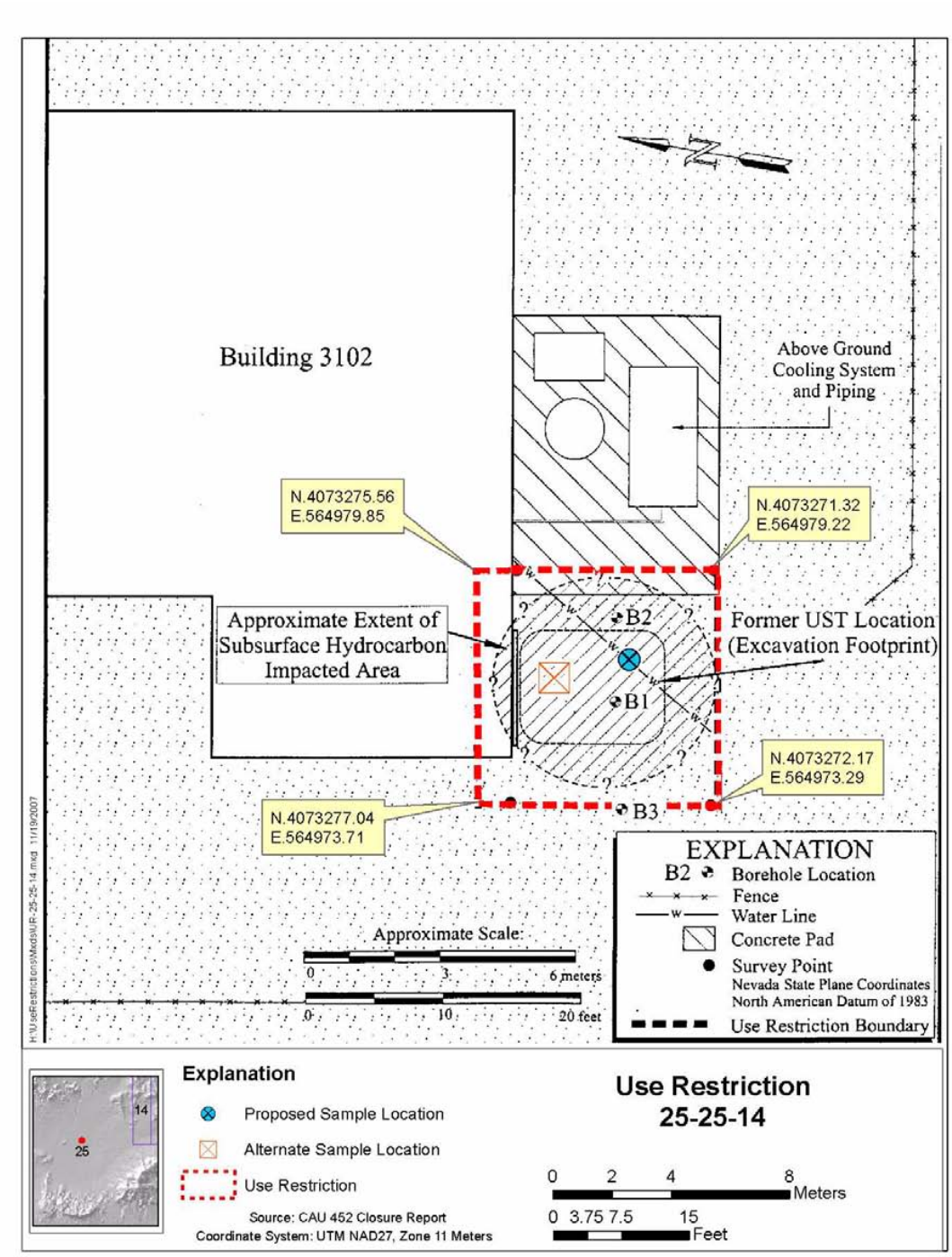

Figure A.2-9
Site Sketch of UR 25-25-14, Spill H940314E (from UST 25-3102-3)

Table A.2-8
Sample Results for CAS 25-25-14

Borehole Identification	Sample Identification	Depth (ft bgs)	TPH Gas (mg/kg)	TPH Diesel (mg/kg)	TPH Oil (mg/kg)
			Action Level 100 mg/kg	Action Level 100 mg/kg	Action Level 100 mg/kg
Borehole 1	3102/B1@25	25	NA	26	<50
Borehole 1	3102/B1@30	30	NA	<10	<50
Borehole 1	3102/B1@35	35	<10	<10	<50
Borehole 2	3102/B2@15	15	NA	**1,400**	<50
Borehole 2	3102/B2@20	20	NA	27	<50
Borehole 2	3102/B2@25	25	NA	<10	<50
Borehole 2	3102/B2@30	30	<10	<10	<50
Borehole 3	3102/B3@10	10	NA	<10	<50
Borehole 3	3102/B3@15	15	<10	<10	<50
Borehole 3	3102/B3@20	20	<10	<10	<50

Note: Bold text indicates value exceeding the action level.

bgs = Below ground surface
ft = Foot
mg/kg = Milligrams per kilogram
NA = Not analyzed
TPH = Total petroleum hydrocarbons
< = Less than

Basis for Current Use Restriction – A full description of previous investigations of CAS 25-25-15 is available in the CAU 452 CR. The only COC present at the site is TPH. Samples were collected below the south excavation bottom, at a depth of approximately 20 ft bgs, from the south end of the tank, one had a TPH concentration of 1,900 mg/kg, exceeding the action level of 100 mg/kg. Additionally, 10 samples were taken from boreholes at CAS 25-25-15 and analyzed for TPH (gasoline, diesel, and oil). Levels of TPH diesel exceeding the action level of 100 mg/kg were detected in 4 of 18 samples, and a UR was implemented. Table A.2-9 contains analytical results for soil samples taken from boreholes at CAS 25-25-15 (DOE/NV, 1998b).

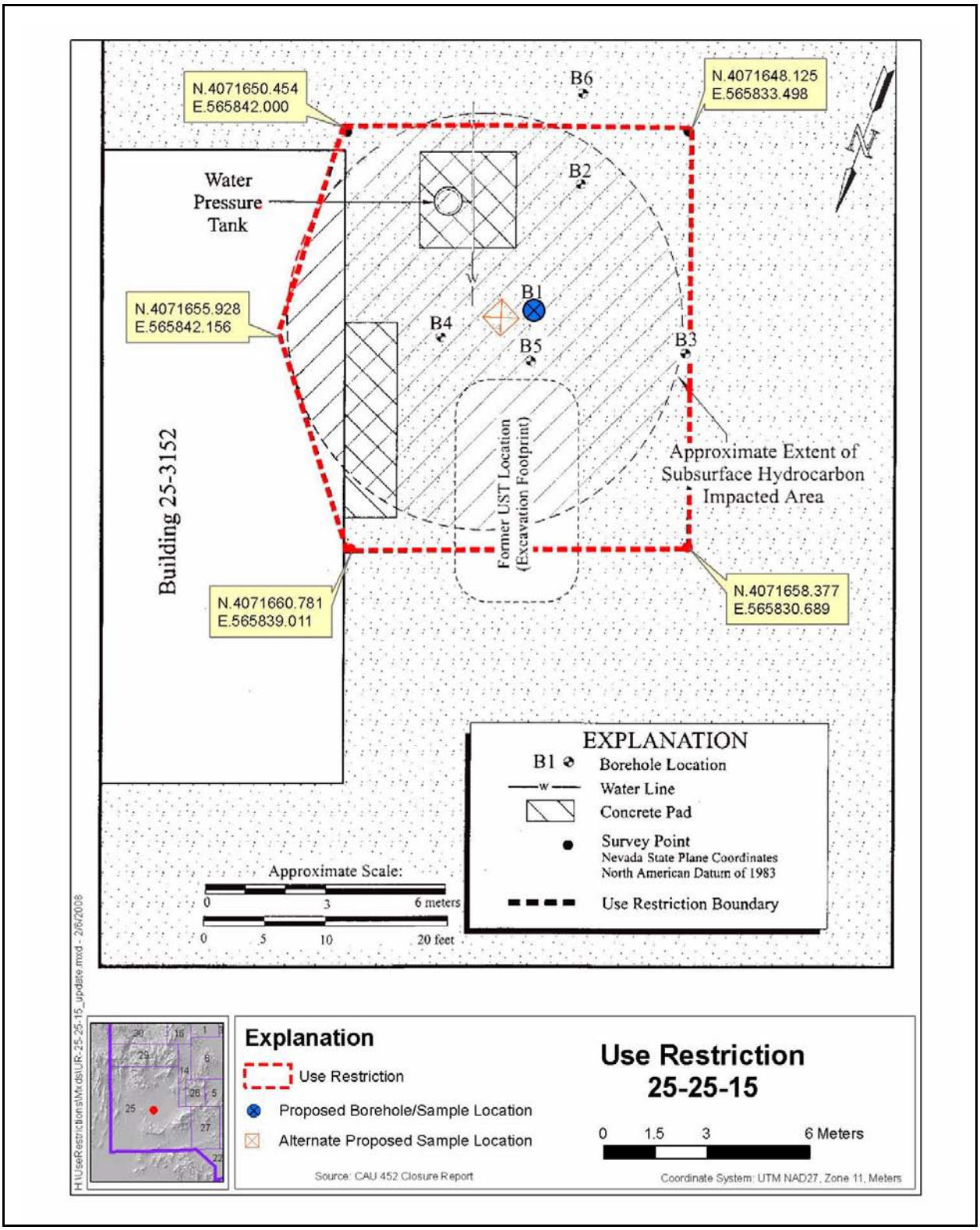

Figure A.2-10
Site Sketch of UR 25-25-15, Spill H941020E (from UST 25-3152-1)

Table A.2-9
Sample Results for CAS 25-25-15
(Page 1 of 2)

Borehole Identification	Sample Identification	Depth (ft bgs)	TPH Gas (mg/kg)	TPH Diesel (mg/kg)	TPH Oil (mg/kg)
			Action Level 100 mg/kg	Action Level 100 mg/kg	Action Level 100 mg/kg
Borehole 1	3152/B1@35	35	NA	**1,700**	NA
Borehole 1	3152/B1@40	40	NA	**620**	NA
Borehole 1	3152/B1@45	45	NA	74	NA
Borehole 2	3152/B2@30	30	NA	<10	<50
Borehole 2	3152/B2@35	35	NA	<10	<50
Borehole 2	3152/B2@40	40	NA	**120**	NA
Borehole 3	3152/B3@30	30	NA	13	NA
Borehole 3	3152/B3@35	35	NA	<10	NA
Borehole 3	3152/B3@40	40	NA	<10	NA
Borehole 4	3152/B4@35	35	NA	**1,600**	NA
Borehole 4	3152/B4@40	40	NA	77	NA
Borehole 4	3152/B4@45	45	NA	<10	NA
Borehole 4	3152/B4@50	50	NA	<10	NA
Borehole 5 (Extension of Borehole 1)	3152/B5@50	50	NA	77	<50
Borehole 5 (Extension of Borehole 1)	3152/B5@55	55	<10	20	<50
Borehole 6 (Extension of Borehole 2)	3152/B6@40	40	NA	<20	NA
Borehole 6 (Extension of Borehole 2)	3152/B6@45	45	NA	<20	NA

Table A.2-9
Sample Results for CAS 25-25-15
(Page 2 of 2)

Borehole Identification	Sample Identification	Depth (ft bgs)	TPH Gas (mg/kg)	TPH Diesel (mg/kg)	TPH Oil (mg/kg)
			Action Level 100 mg/kg	Action Level 100 mg/kg	Action Level 100 mg/kg
Borehole 6 (Extension of Borehole 2)	3152/B6@50	50	NA	<20	NA

Note: Bold text indicates value exceeding the action level.

bgs = Below ground surface
ft = Foot
mg/kg = Milligrams per kilogram
NA = Not analyzed
TPH = Total petroleum hydrocarbons
< = Less than

A.2.9 Use Restriction 12-25-08, Spill H950524F (from UST 12-B-1)

Corrective Action Site 12-25-08 consists of a subsurface petroleum hydrocarbon release from UST 12-B-1 located at the "B" Tunnel in Area 12. There is a UR in place. Figure A.2-11 shows a site sketch of the UR.

Current Use Restriction Description – A UR is in place at the site due to TPH contamination. The UR, as described in the FFACO, states the future use of any land related to this CAU, as described by surveyed location, is restricted from any activity that may alter or modify the containment control as identified by the state and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance.

Basis for Current Use Restriction – A full description of previous investigations of CAS 12-25-08 is available in the CAU 454 CR. The only COC present at the site is TPH, two samples were taken from CAS 12-25-08 and analyzed for TPH diesel. Of these samples, one taken at the east side of the excavation had a TPH diesel level of 490 mg/kg, exceeding the action level of 100 mg/kg, which resulted in a UR. A second sample taken at the west side of the excavation had a TPH diesel level of 92 mg/kg, which is below the action level (DOE/NV, 1998c).

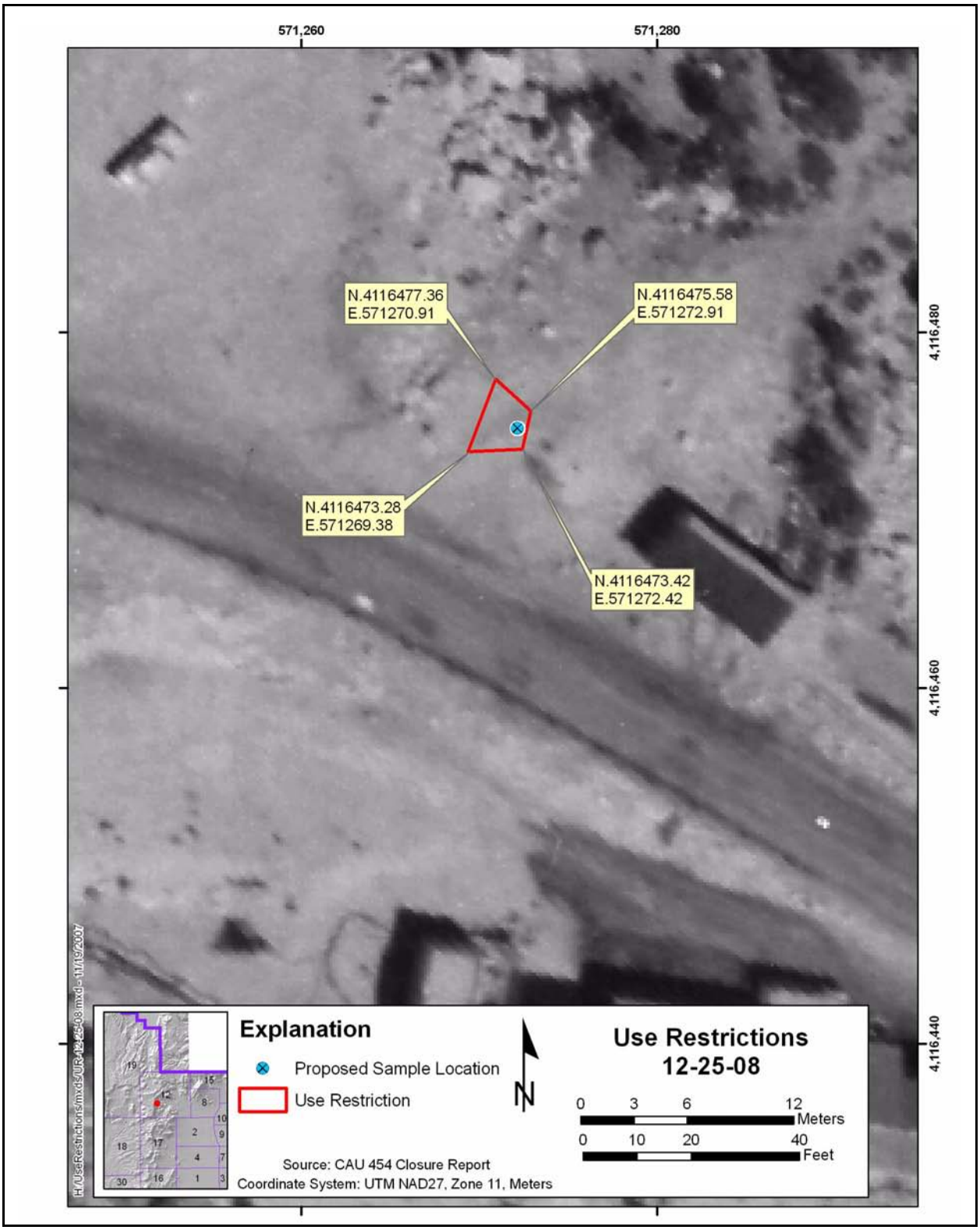

Figure A.2-11
Site Sketch of UR 12-25-08, Spill H950524F (from UST 12-B-1)

A.2.10 Use Restriction 12-25-10, Spill H950919A (from UST 12-COMM-1)

Corrective Action Site 12-25-10 consists of a subsurface petroleum hydrocarbon release from UST 12-COMM-1 located at the former Communications/Power Maintenance Shop in Area 12. There is a UR in place. Figure A.2-12 shows a site sketch of the UR.

Current Use Restriction Description – A UR is in place at the site due to TPH contamination. The UR, as described in the FFACO, states the future use of any land related to this CAU, as described by surveyed location, is restricted from any activity that may alter or modify the containment control as identified by the state and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance.

Basis for Current Use Restriction – A full description of previous investigations of CAS 12-25-10 is available in the CAU 454 CR. Samples taken from CAS 12-25-10 were analyzed for TPH oil, TCLP metals, and PCBs. Based on results from these analyses. The only COC present at the site is TPH. Total petroleum hydrocarbons levels exceeding the action level of 100 mg/kg were detected in six of eight samples. These samples were from a lens of gray material visible in the excavation and attributed to an earlier release. Additional excavation was performed after samples were taken, and the lens of gray material was still visible in remaining soils; therefore, a UR was implemented. Table A.2-10 contains analytical results for soil samples taken before excavation (DOE/NV, 1998c). Although these soils were removed, it is assumed that the remaining gray lens material has similar concentrations.

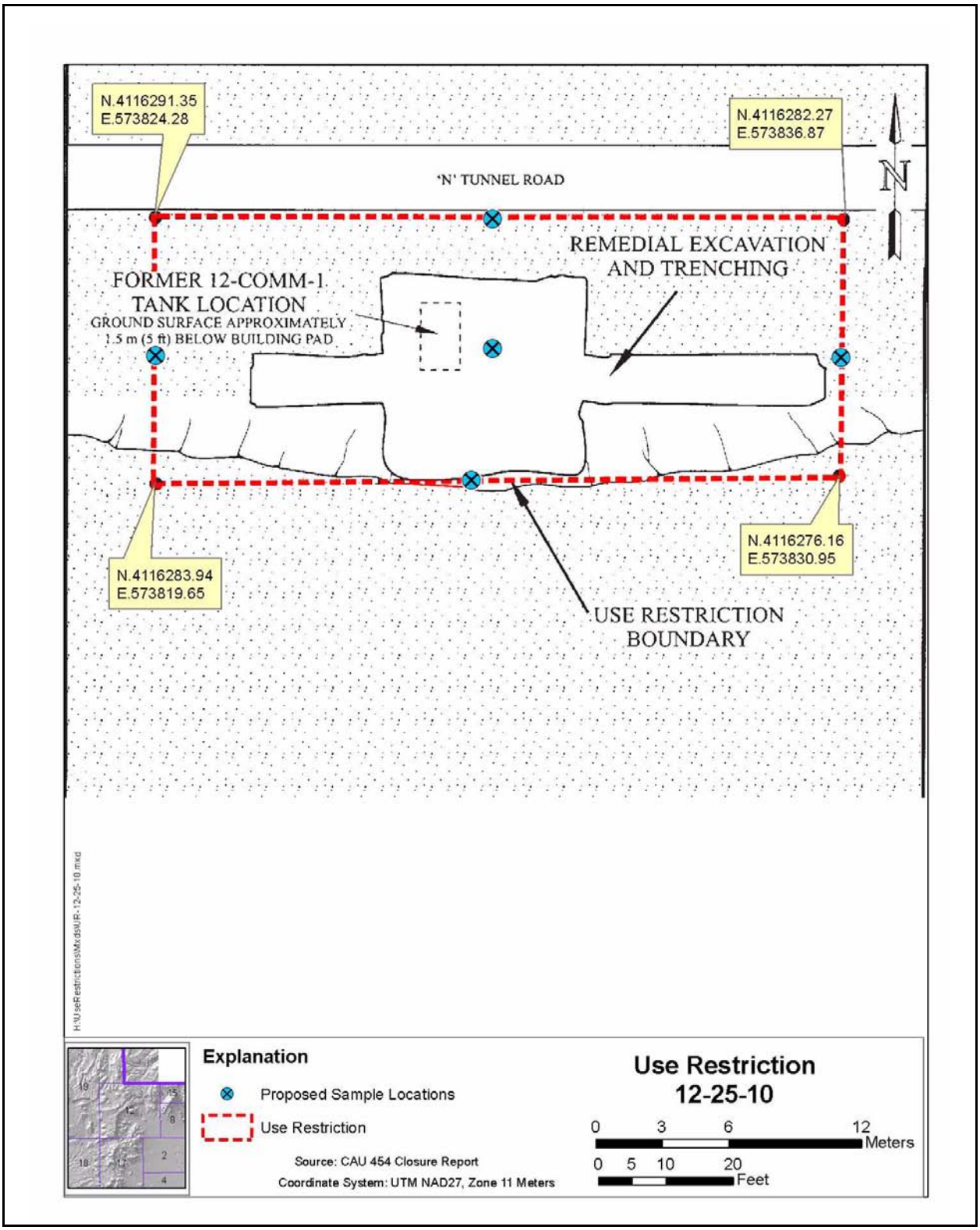

Figure A.2-12
Site Sketch of UR 12-25-10, Spill H950919A (from UST 12-COMM-1)

Table A.2-10
Sample Results for CAS 12-25-10

Sample Identification	Depth (ft bgs)	TPH-Oil (mg/kg)
		Action Level 100 mg/kg
12-COMM-1/North Wall	3	**1,600**
12-COMM-1/North Btm	6	**120**
12-COMM-1/N9	9	<50
12-COMM-1/East Wall	3	**740**
12-COMM-1/West Wall	3	**1,200**
12-COMM-1/South Wall	3	**1,800**
12-COMM-1/South Btm	6	**600**
12-COMM-1/S9	9	<50

Note: Bold text indicates value exceeding the action level.

bgs = Below ground surface
ft = Foot
mg/kg = Milligrams per kilogram
TPH = Total petroleum hydrocarbons
< = Less than

A.2.11 Use Restriction 02-02-03, UST 2-300-1

Corrective Action Site 02-02-03 consists of a subsurface petroleum hydrocarbon release from UST 2-300-1 located at Bunker 2-300-1 in Area 2. There is a UR in place at the site. Figure A.2-13 shows a site sketch of the UR.

Current Use Restriction Description – A UR is in place at the site due to TPH contamination. The UR, as described in the FFACO, states the future use of any land related to this CAU, as described by surveyed location, is restricted from any activity that may alter or modify the containment control as identified by the state and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance.

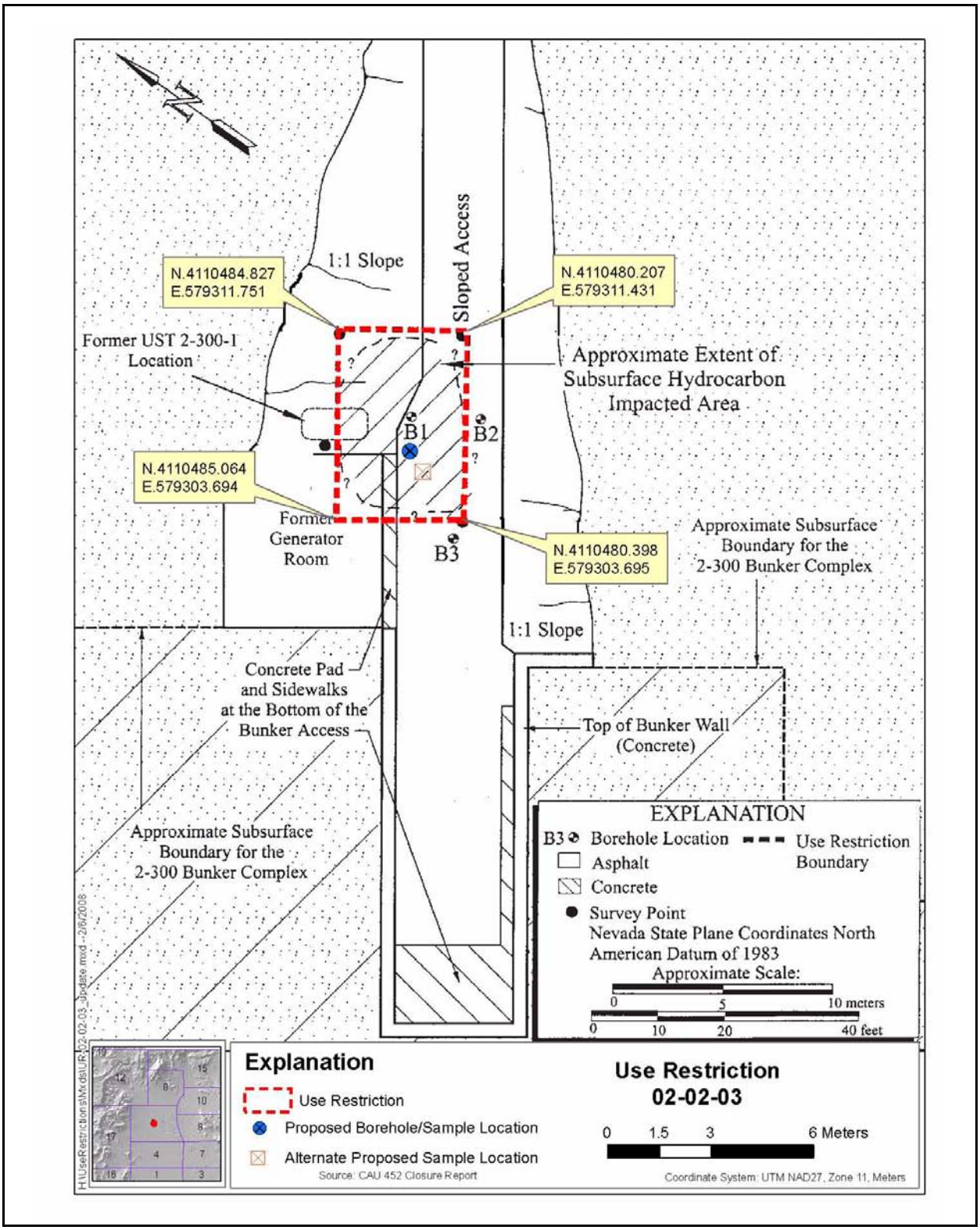

Figure A.2-13
Site Sketch of UR 02-02-03, UST 2-300-1

Basis for Current Use Restriction – A full description of previous investigations of CAS 02-02-03 is available in the CAU 464 CR. The only COC present at the site is TPH. Twelve samples were taken from boreholes at CAS 02-02-03 and analyzed for TPH diesel. Of these samples, one had a TPH diesel level of 230 mg/kg, exceeding the action level of 100 mg/kg, which resulted in a UR. Table A.2-11 contains analytical results for soil samples taken from boreholes at CAS 02-02-03 (DOE/NV, 1998d).

Table A.2-11
Sample Results for CAS 02-02-03

Borehole Identification	Sample Identification	Depth (ft bgs)	TPH Diesel (mg/kg)
			Action Level 100 mg/kg
Borehole 1	2-300/B1@15	15	**230**
Borehole 1	2-300/B1@20	20	<20
Borehole 1	2-300/B1@25	25	<20
Borehole 1	2-300/B1@30	30	<20
Borehole 2	2-300/B2@10	10	<20
Borehole 2	2-300/B2@15	15	<20
Borehole 2	2-300/B2@20	20	<20
Borehole 2	2-300/B2@25	25	<20
Borehole 3	2-300/B3@10	10	<10
Borehole 3	2-300/B3@15	15	<10
Borehole 3	2-300/B3@20	20	<10
Borehole 3	2-300/B3@25	25	<10

Note: Bold text indicates value exceeding the action level.

bgs = Below ground surface
ft = Foot
mg/kg = Milligrams per kilogram
TPH = Total petroleum hydrocarbons
< = Less than

A.2.12 Use Restriction PRL 454, Weathered Diesel Fuel

Corrective Action Site PRL 454 consists of a surface hydrocarbon release identified surrounding concrete pads that formerly supported two diesel generators at the former Microwave Relay Annex located on Shoshone Peak. There is a UR in place. Figure A.2-14 shows a site sketch of the UR.

Current Use Restriction Description – A UR is in place at the site due to TPH contamination. The UR, as recorded in the FFACO, states the future use of any land related to this CAU, as described by surveyed location, is restricted from any DOE or Air Force activity that may alter or modify the containment control as identified by the state and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance. There are no monitoring requirements associated with the UR.

Basis for Current Use Restriction – A full description of previous investigations of CAS PRL 454 is available in the report entitled *Environmental Compliance Program Final UST Remediation Action Report: Phase 2, Offbase Excavate and Remove Sites*. Samples taken from CAS PRL 454 were analyzed for TPH diesel and UEH. Based on results from these analyses, diesel was present at the site below the RL of 250 mg/kg and UEH was present in one composite sample at 3,800 mg/kg, and a UR was implemented (Lockheed Martin Energy Systems, Inc., 1998).

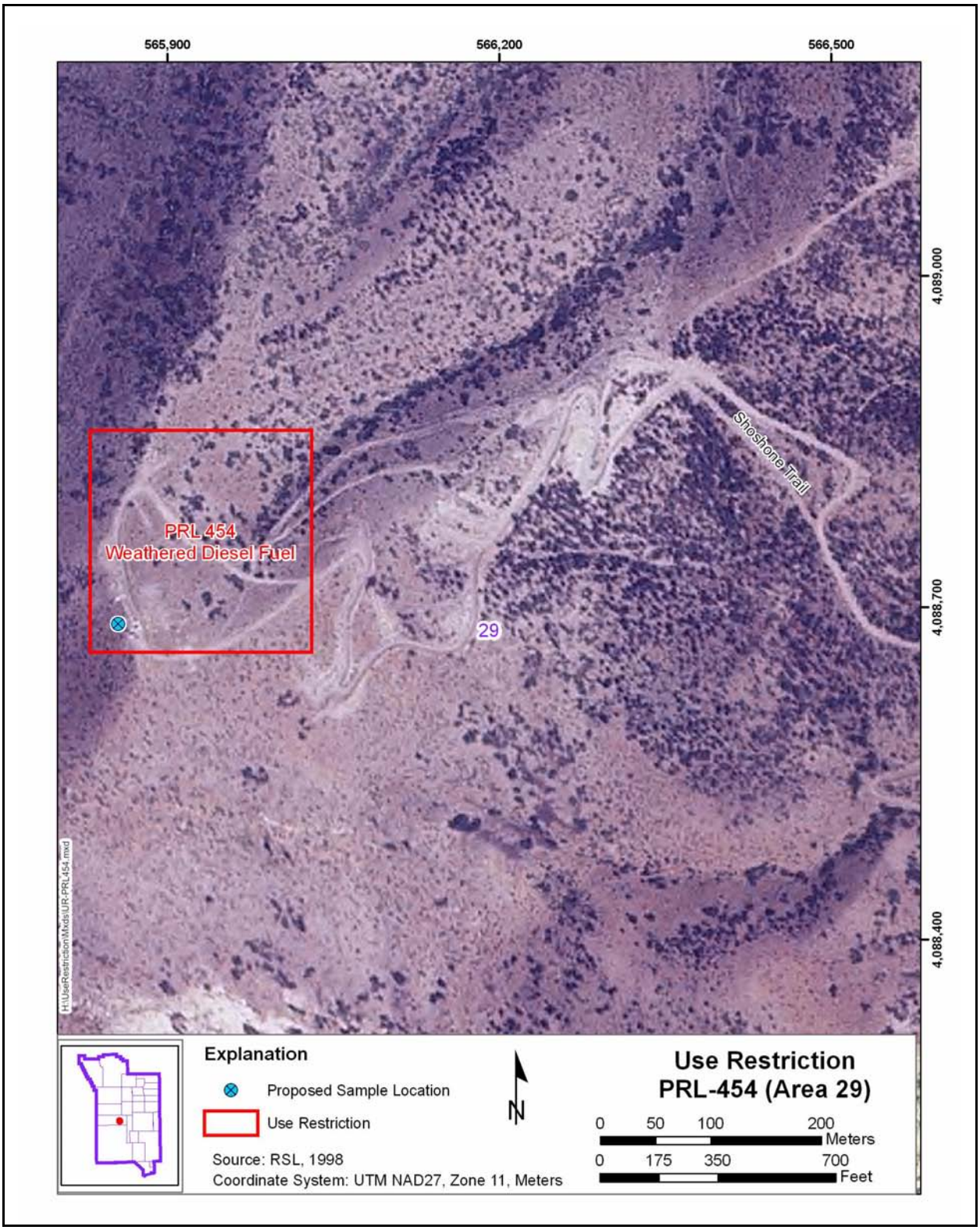

Figure A.2-14
Site Sketch of UR PRL 454, Weathered Diesel Fuel

A.3.0 Step 1 - State the Problem

Step 1 of the DQO process defines the problem that requires study; identifies the planning team, and develops a conceptual model of the environmental hazard to be investigated.

The problem statement for all the URs is: "Existing information on the nature of TPH contamination is insufficient to realign historical URs with current risk-based decision methodology."

A.3.1 Planning Team Members

The DQO planning team consists of representatives from NDEP, NNSA/NSO, SNJV, and NSTec. The DQO planning team met on December 3, 2007, for the DQO meeting. The primary decision-makers are the NDEP and NNSA/NSO representatives.

A.3.2 Conceptual Site Model

The CSM is used to organize and communicate information about site characteristics. It reflects the best interpretation of available information at any point in time. The CSM is a primary vehicle for communicating assumptions about release mechanisms, potential migration pathways, or specific constraints. It provides a good summary of how and where contaminants are expected to move and what impacts such movement may have. It is the basis for assessing how contaminants could reach receptors both in the present and future. The CSM describes the most probable scenario for current conditions at each site, and defines the assumptions that are the basis for identifying appropriate sampling strategy, and data collection methods. Accurate CSMs are important as they serve as the basis for all subsequent inputs and decisions throughout the DQO process.

For the 12 URs addressed in this document, the CSMs were presented in the previous investigation documents. These CSMs were validated by investigation data for each UR collected during the initial CAI. This information and assumptions regarding the UR and site conditions are documented in each respective CAU closure document and includes general physical setting, contaminant sources, release information, knowledge of similar sites, and physical and chemical properties of the affected media and the identified COCs (i.e., TPH-DRO).

The CSMs consist of:

- Contaminant releases including media subsequently affected.
- Release mechanisms (the conditions associated with the release).
- Contaminant source characteristics including contaminants suspected to be present and contaminant-specific properties.
- Site characteristics including physical, topographical, and meteorological information.
- Migration pathways and transport mechanisms that describe the migration pathways and where the contamination was transported based on previous investigations.
- The locations of points of exposure where individuals or populations may come in contact with a COC associated with each UR.
- Routes of exposure where contaminants may enter the receptor.

If additional elements are identified during this supplemental investigation, that are outside the scope of the CSM, the situation will be reviewed and a recommendation will be made as to how to proceed. In such cases, NDEP and NNSA/NSO will be notified and given the opportunity to comment on, or concur with, the recommendation.

The applicability of the CSM to each UR within a CAS is summarized in Table A.3-1 and discussed below. Table A.3-1 provides information on CSM elements that will be used throughout the remaining steps of the DQO process.

A.3.2.1 Contaminant Release

The locations and nature of each release associated with the URs have been identified and documented in the CAU CR. Investigations have shown that TPH contamination was or is highest at soil interfaces, near or at the point of release (i.e., tank opening), and primary transport was vertical migration over lateral migration. For more detailed information on each release history, refer to the appropriate CR provided in Table A.2-1.

Table A.3-1
Conceptual Site Model
Description of Elements for Each UR
(Page 1 of 2)

UR Identifier	06-25-01	06-25-02	12-19-01	19-09-05	03-02-004-0360	25-25-09	25-25-14	25-25-15	12-25-08	12-25-10	02-02-03	PRL 454
UR Description	See Section 2.0											
Site Status	Active		Inactive		Active	Inactive/Abandoned						Active
Exposure Scenario	Industrial Use		Occasional Use		Industrial Use	Occasional Use						
Sources of Potential Soil Contamination	Sources of contamination were determined to be hydrocarbon releases from a variety of ASTs, USTs, and/or generators. In most cases, the source of release (i.e., tank or contaminated soil) were either removed or spill containment was installed.											
Location of Contamination/ Release Point	In each case, the location of the releases have been identified. The releases were consistent with CSM where contamination is located, or near the point of release, and is a contiguous area.											
Amount Released	The known or estimated volumes of TPH released to the surrounding soils are documented in the CADD or CR.											
Affected Media	Subsurface soils		Subsurface soils		Subsurface soils varying from shallow to deep							Surface soils
Potential Contaminants	Total petroleum hydrocarbons contamination is known contaminant at each site; however, presence and concentrations of individual hydrocarbon components (i.e., VOC/SVOC) is unknown.											
Transport Mechanisms	Percolation of precipitation through subsurface media serves as the major driving force for migration of contaminants. Lateral transport has shown to be minimal in comparison to vertical migration in most subsurface releases. Surface releases have shown lateral migration to be predominant where steep slopes and shallow bedrock conditions exist (e.g., PRL 454; 02-02-03).											
Migration Pathways	For subsurface contamination (i.e., UST releases), surface migration pathway is not present; however, vertical migration is most likely through porous alluvial soils. The primary migration pathway for surface contamination would be wind and water erosion over the ground surface with vertical migration limited.											

Table A.3-1
Conceptual Site Model
Description of Elements for Each UR
(Page 2 of 2)

UR Identifier	06-25-01	06-25-02	12-19-01	19-09-05	03-02-004-0360	25-25-09	25-25-14	25-25-15	12-25-08	12-25-10	02-02-03	PRL 454
UR Description	See Section 2.0											
Lateral and Vertical Extent of Contamination	Contamination, where present, is contiguous to the release points. Concentrations were found to decrease from the source with distance and depth. No groundwater contamination was identified. Lateral and vertical extent of COC contamination is spatially bound by the UR.											
Exposure Pathways	The potential for contamination exposure is limited to industrial and construction workers and military personnel conducting training. These human receptors may be exposed to COCs through oral ingestion, inhalation, dermal contact (absorption) of soil and/or debris due to inadvertent disturbance of these materials.											

AST = Aboveground storage tank
CADD = Corrective Action Decision Document
COC = Contaminant of concern
CR = Closure Report
CSM = Conceptual site model
SVOC = Semivolatile organic compound
TPH = Total petroleum hydrocarbons
UR = Use restriction
UST = Underground storage tank
VOC = Volatile organic compound

A.3.2.2 Potential Contaminants

Each UR being proposed for supplemental investigation has identified TPH as the COC and the basis of the UR. The COPCs are the potentially hazardous constituents of TPH as listed in Table A.1-1. The potentially hazardous constituent concentrations of TPH at each UR site are not available because VOC and SVOC analysis were either not conducted as part of the initial investigation, or complete analytical data are not available.

Targeted contaminants are those COPCs for which evidence, in available site and process information, suggests that they may be reasonably suspected to be present at a given CAS. The targeted contaminants are required to meet a more stringent completeness criteria than other COPCs thus providing greater protection against a decision error (see Section 6.2.6). Targeted contaminants for each UR within a CAS are identified as the potentially hazardous constituents of TPH.

A.3.2.3 Migration Pathways, Transport Mechanisms, and Exposure Scenarios

Previous investigations at each CAS confirmed infiltration and percolation of precipitation as a driving force for downward migration of contaminants is limited as a result of high potential evapotranspiration and limited precipitation for this region. Percolation of infiltrated precipitation at the NTS does not provide a significant mechanism for vertical migration of contaminants to groundwater (DOE/NV, 1992).

Human receptors may be exposed to COCs through oral ingestion, inhalation, dermal contact (absorption) of soil or debris due to inadvertent disturbance of these materials. The land-use and exposure scenarios for the NTS URs are listed in Table A.3-2. These are based on NTS current and future land use. The TTR UR is not listed in Table A.3-2 because it does not fall within the land-use designations of the NTS. The URs located in Area 6 and the TTR are classified as an industrial work area because NTS and TTR personnel are assigned to work stations adjacent to the URs. Although URs located in Areas 2, 12, 19, 25, and 29 are located in areas where structures from past activities exist, no facilities are present to allow these areas to be used as an assigned work station for NTS site personnel. There is still the possibility, however, that site workers could occupy these locations on an occasional and temporary basis such as a military exercise. Therefore, these sites are classified as occasional work areas.

Table A.3-2
Land-Use and Exposure Scenarios

UR	Record of Decision Land-Use Zone	Exposure Scenario
25-25-09 25-25-14 25-25-15	**Research Test and Experiment Zone** This area is designated for small-scale research and development projects and demonstrations; pilot projects; outdoor tests; and experiments for the development, quality assurance, or reliability of material and equipment under controlled conditions. This zone includes compatible defense and non-defense research, development, and testing projects and activities.	Occasional Use Area Worker will be exposed to the site occasionally (up to 80 hours per year for 5 years). Site structures are not present for shelter and comfort of the worker.
02-02-03 12-19-01 12-25-08 12-25-10	**Nuclear and High Explosives Test** This area is designated within the Nuclear Test Zone for additional underground nuclear weapons tests and outdoor high-explosive tests. This zone includes compatible defense and non-defense research, development, and testing activities.	Occasional Use Area Worker will be exposed to the site occasionally (up to 80 hours per year for 5 years). Site structures are not present for shelter and comfort of the worker.
06-25-01 06-25-02	**Defense Industrial Zone** This area is designated for stockpile management of weapons (including production), assembly, disassembly or modification, staging, repair, retrofit, and surveillance. Also included in this zone are permanent facilities for stockpile stewardship operations involving equipment and activities such as radiography, lasers, material processing, and pulsed power.	Industrial Area Worker will be exposed to the site full time (225 days per year, 10 hours per day for 25 years). Active powered buildings with toilets are present at the site.
PRL 454	**Reserved Zone** This area includes land and facilities that provide wide-spread flexible support for diverse short-term testing and experimentation. The reserved zone is also used for short duration exercises and training nuclear emergency response and Federal Radiological Monitoring and Assessment Center training and U.S. Department of Defense land-navigation exercises and training.	Industrial Area Worker will be exposed to the site full time (225 days per year, 10 hours per day for 25 years). Active powered buildings with toilets are present at the site.
19-09-05	**Nuclear Test** This area is reserved for dynamic experiments, hydrodynamic tests, and underground nuclear weapons and weapons effects tests. This zone includes compatible defense and non-defense research, development, and testing activities.	Occasional Use Area Worker will be exposed to the site occasionally (up to 80 hours per year for 5 years). Site structures are not present for shelter and comfort of the worker.

A.4.0 Step 2 - Identify the Goal of the Study

Step 2 of the DQO process states how environmental data will be used in meeting objectives and solving the problem, identifies study questions or decision statement(s), and considers alternative outcomes or actions that can occur upon answering the question(s). The principal study question for this investigation is: "Can current URs be removed or reduced using the current IS RBCA process?"

A.4.1 Decision Statement

The Decision statement is: "Are any TPH constituents above FALs present in environmental media within the UR?" Any analytical result for a COPC above the FAL will result in that COPC being designated as a COC. A COC may also be defined as a contaminant that, in combination with other like contaminants, is determined to jointly pose an unacceptable risk based on a multiple constituent analysis (NNSA/NSO, 2006). If a COC is detected, then the UR will not be modified.

A.4.2 Alternative Actions to the Decision

In this section, the actions that may be taken to solve the problem are identified depending on the possible outcomes of the investigation.

If the site does not contain a contaminant exceeding a FAL, the UR will be removed. If the site contains a contaminant exceeding a FAL, the recommendation to modify the UR will be based on the following decision hierarchy:

1. If the site contains a contaminant exceeding a FAL based on the site-specific foreseeable future land-use exposure scenario (see Section 3.1.1), a full FFACO UR will be required.

Otherwise:

2. If the site contains a contaminant exceeding a FAL based on the Industrial Area exposure scenario, the UR will be modified to an administrative UR. Changing a UR to an administrative UR would eliminate ongoing cost for inspection and maintenance, UR database maintenance, and the costs associated with tracking usage at the sites as well as any costs associated with restrictions to future site activities.

A.5.0 Step 3 - Information Needs

Step 3 of the DQO process identifies the information needed, determines sources for information, and identifies sampling and analysis methods that will allow reliable comparisons with FALs.

To resolve the DQO Decision (determine whether a COC is present at a given CAS), samples need to be collected and analyzed following these criteria:

- Samples must be collected in areas most likely to contain a COC. This will be defined as the area of the highest concentration of TPH.
- The analytical suite selected must be sufficient to identify any COCs present in the samples. This will be defined as the VOC and SVOC analytical methods as these methods report all of the potentially hazardous constituents of TPH.

A.5.1 Sources of Information

Information to satisfy the DQO Decision will be generated by collecting environmental samples using grab sampling, hand auguring, direct push, backhoe excavation, drilling, or other appropriate sampling methods. These samples will be submitted to analytical laboratories meeting the quality criteria stipulated in the IS QAPP (NNSA/NV, 2002b). Only validated data from analytical laboratories will be used to make DQO decisions. Sample collection and handling activities will follow standard procedures.

A.5.1.1 Sample Locations

Design of the sampling approaches for the URs must ensure that the data collected are sufficient to support the recommendation to modify or remove the current UR using the current IS RBCA process. To meet this objective, the samples collected from will be from remaining locations at each UR that have the highest TPH contamination.

When feasible, samples will be in the same location of the highest TPH sample result upon which the UR is based. When this is not feasible, sample locations will be selected using the following biasing factors:

- An elevated VOC headspace analysis result.

- Stains and/or odor: Any spot or area on the soil surface that may indicate the presence of a TPH contamination. Typically, stains indicate an organic liquid such as an oil has reached the soil, and may have spread vertically and horizontally.

- Preselected areas based on process knowledge of the site: Locations where evidence exists and where releases of TPH have occurred (e.g., investigation photographs, previous tank excavation, soil boring locations, or previous investigations).

- Preselected areas based on process knowledge of the contaminant(s): Locations that may reasonably have received contamination, selected on the basis of the chemical and/or physical properties of the contaminant(s) in that environmental setting.

- Visual indicators such as discoloration, textural discontinuities, disturbance of native soils, or other indications of potential contamination.

A.5.1.2 Analytical Methods

The data needed to resolve the decision statements (results for the hazardous constituents) will be provided by the VOC and SVOC analytical methods. The laboratory requirements (e.g., MDC, precision, and accuracy) for these methods are provided in Table 3-2.

A.6.0 Step 4 - Define the Boundaries of the Study

Step 4 of the DQO process defines the target population of interest and its relevant spatial boundaries, specifies temporal and other practical constraints associated with sample/data collection, and defines the sampling units on which decisions or estimates will be made.

A.6.1 Target Populations of Interest

The population of interest to resolve the DQO decision ("Are any TPH constituents above FALs present in environmental media within the UR?") is the reported concentration of each potentially hazardous constituent of TPH at the location containing the highest TPH concentration.

A.6.2 Spatial Boundaries

Spatial boundaries are the identified and documented lateral and vertical extent of each UR.

A.6.3 Practical Constraints

Practical constraints such as military activities at the NTS, weather (e.g., high winds, rain, lightning, extreme heat), utilities, threatened or endangered animal and plants, unstable or steep terrain, and/or access restrictions may affect the ability to investigate a site. The practical constraints associated with the investigation of the multiple URs are summarized in Table A.6-1.

Table A.6-1
Practical Constraints for the UR Field Investigation
(Page 1 of 2)

UR	Practical Constraints
06-25-01	Weather (e.g., high winds, rain, lightning, extreme heat); complexity of underground utilities in UR may require substantial hand excavating.
06-25-02	Weather (e.g., high winds, rain, lightning, extreme heat); complexity of underground utilities in UR may require substantial hand excavating.
12-19-01	Weather (e.g., high winds, rain, lightning, extreme heat); restricted access due to NTS activities.
19-09-05	Weather (e.g., high winds, rain, lightning, extreme heat); restricted access due to NTS activities.
03-02-004-0360	Weather (e.g., high winds, rain, lightning, warm temperatures); underground utilities and aboveground utilities; restricted access due to TTR/USAF activities.

Table A.6-1
Practical Constraints for the UR Field Investigation
(Page 2 of 2)

UR	Practical Constraints
12-25-08 and 12-25-10	Weather (e.g., high winds, rain, lightning, extreme heat); restricted access due to NTS activities; steep slope in sampling area.
25-25-09, 25-25-14, 25-25-15	Weather (e.g., high winds, rain, lightning, extreme heat); restricted access due to NTS activities; underground and/or aboveground utilities.
PRL 454	Weather (e.g., high winds, rain, lightning, extreme heat); restricted access due to NTS activities; steep slope in sampling area.

NTS = Nevada Test Site
TTR = Tonopah Test Range
USAF = U.S. Air Force
UR = Use restriction

A.6.4 Define the Sampling Units

The scale of decision-making in the DQO decision is defined as boundary of each UR.

A.7.0 Step 5 - Develop the Analytic Approach

Step 5 of the DQO process specifies appropriate population parameters for making decisions, defines action levels, and generates an "If … then … else" decision rule that involves it.

A.7.1 Population Parameters

For judgmental sampling results, the population parameter is the observed concentration of each contaminant from each individual analytical sample. Each sample result will be compared to the FALs to determine the appropriate resolution to the DQO decision. A single sample result for any contaminant exceeding a FAL would cause a determination that a COC is present within the CAS.

A.7.2 Preliminary Action Levels

The PALs presented in this section are to be used for site screening purposes. They are not necessarily intended to be used as cleanup action levels or FALs. However, they are useful in screening out contaminants that are not present in sufficient concentrations to warrant further evaluation and, therefore, streamline the consideration of remedial alternatives. The current RBCA process used to establish FALs is described in the *Industrial Sites Project Establishment of Final Action Levels* (NNSA/NSO, 2006). This process conforms with NAC Section 445A.227 (NAC, 2006a), which lists the requirements for sites with soil contamination. For the evaluation of corrective actions, NAC Section 445A.22705 (NAC 2006b) requires the use of ASTM Method E 1739 to (ASTM, 1995) "conduct an evaluation of the site, based on the risk it poses to public health and the environment, to determine the necessary remediation standards (i.e., FALs) or to establish that corrective action is not necessary."

This RBCA process defines three tiers (or levels) of evaluation involving increasingly sophisticated analyses:

- Tier 1 evaluation - Sample results from source areas (highest concentrations) are compared to action levels based on generic (non-site-specific) conditions (i.e., PALs). The FALs may then be established as the Tier 1 action levels or the FALs may be calculated using a Tier 2 evaluation.

- Tier 2 evaluation - Conducted by calculating Tier 2 SSTLs using site-specific information as inputs to the same or similar methodology used to calculate Tier 1 action levels. The Tier 2

SSTLs are then compared to individual sample results from reasonable points of exposure (as opposed to the source areas as is done in Tier 1) on a point-by-point basis. Total TPH concentrations will not be used for risk-based decisions under Tier 2 or Tier 3. Rather, the individual chemicals of concern will be compared to the SSTLs.

- Tier 3 evaluation - Conducted by calculating Tier 3 SSTLs on the basis of more sophisticated risk analyses using methodologies described in Method E 1739-95 that consider site-, pathway-, and receptor-specific parameters.

The comparison of laboratory results to the FALs are used to evaluate the need for, and type of, UR at each site. The FALs will be defined (along with the basis for their definition) in the investigation report. The FALs are based on the risk posed by the following COPCs that are associated with TPH-DRO:

- 1,3,5-Trimethylbenzene
- 2-Methylnaphthalene
- Anthracene
- Benzo(a)anthracene
- Benzene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Benzo(g,h,i)perylene
- Benzo(k)fluoranthene
- Chrysene
- Ethylbenzene
- Fluoranthene
- Fluorene
- Naphthalene
- n-Butylbenzene
- n-Propylbenzene
- Phenanthrene
- Pyrene
- Toluene
- Total xylenes (combination of o-, m-, and p-xylenes)

These COPCs are included in the list of reported analytical results from the VOCs and SVOCs analytical methods.

A.7.2.1 Tier 1 Based FALs

All FALs based on a Tier 1 evaluation will be defined as the EPA Region 9 Risk-Based PRGs for chemical contaminants in industrial soils (EPA, 2004).

A.7.2.2 Tier 2 Based FALs

All FALs established based on a Tier 2 evaluation are calculated using one of the following site-specific exposure scenarios (as defined in the IS RBCA document):

- Industrial Area - Worker will be exposed to the site full time (225 days per year, 10 hours per day for 25 years).
- Remote Work Area - Worker will be exposed to the site part time (up to 336 hours per year for 25 years).
- Occasional Use Area - Worker will be exposed to the site occasionally (up to 80 hours per year for 5 years).

A.7.2.3 Tier 3 Based FALs

No FALs are expected to be established based on a Tier 3 evaluation.

A.7.3 Decision Rules

The decision rules are presented in Section A.4.2.

A.8.0 Step 6 - Specify Performance or Acceptance Criteria

Step 6 of the DQO process defines the decision hypotheses, specifies controls against false rejection and false acceptance decision errors, examines consequences of making incorrect decisions from the test, and places acceptable limits on the likelihood of making decision errors.

A.8.1 Decision Hypotheses

The baseline condition (i.e., null hypothesis) and alternative condition for the DQO decision are:

- Baseline condition – A COC is present.
- Alternative condition – A COC is not present.

Decisions and/or criteria have false negative or false positive errors associated with their determination. The impact of these decision errors and the methods that will be used to control these errors are discussed in the following subsections.

A.8.2 False Negative Decision Error

The false negative decision error would mean deciding that a COC is not present when it actually is. The potential consequence is removing a UR from a contaminated site resulting in an increased risk to human health and environment.

The false negative decision error (where consequences are more severe) for judgmental sampling designs is controlled by meeting these criteria:

1. Having a high degree of confidence that the sample locations selected will identify COCs if present within the CAS.
2. Having a high degree of confidence that analyses conducted will be sufficient to detect any COCs present in the samples.
3. Having a high degree of confidence that the dataset is of sufficient quality and completeness.

To satisfy the first criterion, samples must be collected in areas most likely to be contaminated by COCs. All of the URs addressed by this document have been characterized through previous investigations and have defined TPH contamination based on analytical results of soil samples.

Samples will be collected from the sample locations with the highest remaining TPH contamination (i.e., in some areas the highest concentrations were removed as part of a corrective action). The field-screening methods and biasing factors listed in Section A.5.1.1 will be used to further ensure that appropriate sampling locations are selected to meet these criteria. Field-screening equipment will be calibrated and checked in accordance with the manufacturer's instructions and approved procedures. The investigation report will present an assessment on the DQI of representativeness that samples were collected from those locations that best represent the populations of interest as defined in Section A.6.1.

To satisfy the second criterion, samples will be analyzed for VOCs and SVOCs. The DQI of sensitivity will be assessed for all analytical results to ensure that all sample analyses had measurement sensitivities (detection limits) that were less than or equal to the corresponding FALs. If this criterion is not achieved, the affected data will be assessed (for usability and potential impacts on meeting site characterization objectives) in the investigation report.

To satisfy the third criterion, the entire dataset, as well as individual sample results, will be assessed against the DQIs of precision, accuracy, comparability, and completeness as defined in the IS QAPP (NNSA/NV, 2002b) and in Section 6.2.2 of this document. The DQIs of precision and accuracy will be used to assess overall analytical method performance as well as to assess the need to potentially "flag" (qualify) individual contaminant results when corresponding QC sample results are not within the established control limits for precision and accuracy. Data qualified as estimated for reasons of precision or accuracy may be considered to meet the constituent performance criteria based on an assessment of the data. The DQI for completeness will be assessed to ensure that all data needs identified in the DQO have been met. The DQI of comparability will be assessed to ensure that all analytical methods used are equivalent to standard EPA methods so that results will be comparable to regulatory action levels that have been established using those procedures. Strict adherence to established procedures and QA/QC protocol protects against false negatives. Site-specific DQIs are discussed in more detail in Sections 6.2.2 through 6.2.8.

To provide information for the assessment of the DQIs of precision and accuracy, the following QC samples will be collected as required by the IS QAPP (NNSA/NV, 2002b):

- Field duplicates (minimum of 1 per matrix per 20 environmental samples)
- Laboratory QC samples (minimum of 1 per matrix per 20 environmental samples)

A.8.3 False Positive Decision Error

The false positive decision error would mean deciding that a COC is present when it is not, resulting in unnecessary UR costs to maintain the UR, and loss of use of the area.

False positive results are typically attributed to laboratory and/or sampling/handling errors that could cause cross contamination. To prevent cross contamination, decontamination of sampling equipment will be conducted according to established and approved procedures, and only clean sample containers will be used. To determine whether a false positive analytical result may have occurred, the following QC samples will be collected as required by the IS QAPP (NNSA/NV, 2002b):

- Trip blanks (1 per sample cooler containing VOC environmental samples)
- Equipment blanks (1 per sampling event for each type of decontamination procedure)
- Source blanks (1 per source lot of uncharacterized decon water)

A.9.0 Step 7 - Develop the Plan for Obtaining Data

Step 7 of the DQO process selects and documents a design that will yield data that will best achieve performance or acceptance criteria. A judgmental sampling scheme will be implemented to select sample locations and evaluate analytical results for each UR. Section A.9.1 contains general information about collecting samples under the judgmental sampling designs, while the subsequent sections provide UR-specific sampling activities, including proposed sample locations.

A.9.1 Judgmental Sampling

A judgmental sampling design will be implemented for all URs within the selected CASs. Because individual sample results, rather than an average concentration, will be used to compare to FALs at each UR, statistical methods to generate site characteristics will not be used. If good prior information is available on the target site of interest (as is the case for these URs), then the sampling may be designed to collect samples only from areas on the target site known to have the highest concentration levels. If the observed concentrations from these samples are below the action level, then a decision can be made that the site does not contain unsafe levels of the contaminant without the samples being truly representative of the entire area (EPA, 2006).

A.9.2 Use Restriction 06-25-01, CP-1 Heating Oil Release

During sampling, a shallow subsurface soil sample will be collected from within the CP bus parking lot (one of three areas in the UR) near the location representing the highest remaining TPH concentrations (9,000 mg/kg). This selected location is east of the original soil excavation along the pipeline segment between boring B-1 and B-2 near previous samples 062501-25 and 062501-24. Anticipated sample depths are between 2 to 5 ft bgs based on previous data and will be collected using a hand or power auger. Any asphalt present above sampling locations will be removed before augering. Field-screening and biasing factors will be used to determine the most suitable sample interval for laboratory analysis. If the initial auger boring does not indicate comparable TPH concentrations (i.e., no stain, odor, or elevated field-screening results), other auger locations may be selected further eastward along the pipeline towards boring B-7 until TPH contamination is identified at concentrations comparable to the 1,200 to 9,000 mg/kg results along the eastern pipeline segment.

Because all three areas resulted from leaks of heating oil, all three have the same TPH contaminant source. Therefore, a result from the location with the highest concentration of heating oil (i.e., the CP parking lot) can be used conservatively to make a decision on all remaining contamination assumed to exist within the overall UR. Therefore, no sample collection is planned at the second and third UR areas.

The third UR area cannot be accessed for sampling due to large number of underground utilities and pipelines. Historical pipeline testing conducted during the Phase I of the investigation showed inconclusive results for a competent pipeline along the utility corridor and therefore the UR was placed along the corridor. Based on descriptions of the original 1991 heating oil release, within the CP parking lot (discharging to the surface in a "geyser-like" manner due to a line rupture), and because no other similar releases were reported within the CP area, it is unlikely other significant heating oil releases occurred when the pipeline was still pressurized. Slow leaks in the deteriorated pipeline may be present, but releases are unlikely on the scale of the 1991 release, given no other "geyser-like" occurrences were identified. Proposed sampling locations are shown in Figure A.2-3.

A.9.3 Use Restriction 06-25-02, UST Release

This site has an active 10,000-gal heating oil tank with a surrounding gravel tank backfill and spill containment. Two excavations have occurred at the fill port and surrounding soil where the release was identified. The first excavation and soil removal was to a depth of 1 to 2 ft bgs around the fill port and a confirmation sample indicated a remaining TPH concentration (261 mg/kg) near the east side of the concrete pad. A second excavation removed additional soil/gravel around the fill port down to the top of the tank to allow installation of spill and overfill equipment; however, no confirmation soil samples were collected at this time, and it is unknown whether all TPH-contaminated soils were removed.

Therefore, during sampling, sampling efforts will initially concentrate in the area of the fill port and attempt to identify biasing factors to locate remaining TPH contamination. If site conditions indicate that most, if not all, the TPH-impacted soil surrounding the fill port were removed (i.e., no stain, odor, elevated field-screening), then sampling efforts will be redirected to the east side of the pad, along the edge of the tank in and/or below the gravel tank backfill, which may have served as a pathway for downward movement of the TPH release. A subsurface soil and/or gravel backfill sample will be

collected either by hand, auger (hand or power), or excavation depending on site conditions encountered. The final depth interval selected is dependent on biasing factors encountered, base of the fill port containment, the base of the tank and gravel backfill, and field-screening results. Because the surrounding boreholes B-1 to B-3 indicated TPH below FALs, these locations will not be sampled. Proposed sample locations are shown in Figure A.2-4.

A.9.4 Use Restriction 12-19-01, A12 Fleet Ops Steam Cleaning Efflu.

Following the release of the steam cleaning effluent, soil samples were collected and analyzed before soil excavation activities. Several areas were excavated where highest TPH contamination was identified (up to 8,500 mg/kg in Sample Area 13). During sampling, selected locations at former Sample Plot C (former Sample Area 2) will be collected, field-screened, and one sample submitted for laboratory analysis. Location Sample Plot C represents an area with the highest remaining detection (5,500 mg/kg) of TPH-oil after the initial excavation activities were conducted. The surface samples will be collected by hand using a scoop/spade at an approximate depth of 2 to 8 inches (in.) bgs consistent with previous analytical results. However, sample depths may vary slightly depending on baising factors (e.g., staining) and soil conditions. If site conditions and biasing factors are not easily identified at Sample Plot C, alternate sample locations may be identified at Sample Plot A or B where next highest TPH contamination remains. Proposed sample locations are shown in Figure A.2-5.

A.9.5 Use Restriction 19-09-05, Mud Pit

During sampling, previous sample location of 190905-1MP representing the highest TPH concentration (138 mg/kg TPH-diesel and 970 mg/kg TPH-oil) remaining within the boundary of the mud pit will be resampled for this investigation. The surface sample (0 to 6-in.) will be collected by hand using a scoop/spade. Biasing factors that represent the area most likely to contain highest concentrations (e.g., staining, composition of the mud, lowest surface, and field-screening) may be used to determine an alternate sample location if the original location cannot be determined in the field. Proposed sample locations are shown in Figure A.2-6.

A.9.6 Use Restriction 03-02-004-0360, Underground Storage Tanks

During sampling, a new boring will be drilled near location SB-5 where the highest TPH concentrations (12,000 mg/kg) remain. A new boring will be drilled within a 3-ft radius of SB-5, west toward the former boring SO-3B, to an approximate depth of 75 ft bgs, if feasible (i.e., no refusal). Soil samples will be collected at 5-ft intervals and field-screened above and below the anticipated collection depth of 22 ft bgs. However, the interval with the highest photoionization detector (PID) field-screening result will be submitted for analysis to achieve a comparable TPH result. Alternate boring locations may be chosen if the new boring cannot be located near SB-5 due to practical constraints associated with the industrial activities of the area. Proposed sample locations are shown in Figure A.2-7.

A.9.7 Use Restriction 25-25-09, Spill H940825C

The former UST and surrounding soil have been removed through excavation. This UR will have one biased sample collected at a subsurface interval near boring B-1 where the highest TPH concentrations (420 mg/kg) were identified and remain at an approximate depth of 20 ft bgs. A new boring will be drilled slightly downgradient and south of B-1, within a 3-ft radius, to a depth of approximately 35 ft bgs, if feasible (i.e., no refusal). Soil samples will be collected at 5-ft intervals and field-screened above and below the anticipated collection depth of 20 ft bgs. However, the interval with the highest PID field-screening result will be submitted for analysis to achieve a comparable TPH result. Proposed sample locations are shown in Figure A.2-8.

A.9.8 Use Restriction 25-25-14, Spill H940314E

The former UST and surrounding soil have been removed through excavation. This UR will have one biased sample collected at a subsurface interval near boring B-2 where the highest TPH concentrations (1,400 mg/kg) were identified and remain at an approximate depth of 15 ft bgs. A new boring will be drilled slightly downgradient and south of B-2, within a 3-ft radius, to an approximate depth of 30 ft bgs, if feasible (i.e., no refusal). Soil samples will be collected at 5-ft intervals and field-screened above and below the anticipated collection depth of 15 ft bgs. However, the interval with the highest PID field-screening result will be submitted for analysis to achieve a comparable TPH result. Proposed sample locations are shown in Figure A.2-9.

A.9.9 Use Restriction 25-25-15, Spill H941020E

The former UST and surrounding soil have been removed through excavation. This UR will have one biased sample collected at a subsurface interval near boring B-1 where the highest TPH concentrations (1,700 mg/kg) were identified and remain at an approximate depth of 35 ft bgs. A new boring will be drilled within a 3-ft radius of B-1 towards the direction of the former B-4 boring location (where TPH was detected at 1,600 mg/kg at 35 ft bgs) to an approximate depth of 55 ft bgs, if feasible (i.e., no refusal). Soil samples will be collected at 5-ft intervals and field-screened above and below the anticipated depth of 35 ft bgs. However, the interval with the highest PID field-screening result will be submitted for analysis to achieve a comparable TPH result. Proposed sample locations are shown in Figure A.2-10.

A.9.10 Use Restriction 12-25-08, Spill H950524F

The UST has been removed through excavation and the UR will have one biased sample collected at the subsurface interval where the highest TPH concentrations (490 mg/kg) were identified on the eastern end of the tank excavation. Several locations (up to five) within the eastern portion of the excavation may be collected for field-screening purposes to aid selection of the sample for laboratory analysis. The anticipated sample depths are 1 to 3 ft bgs and will be collected with a hand auger or scoop/spade method. A second sample may be collected on the downslope gradient where excavation did not occur, provided biasing factors (e.g., stain) are present to indicate likely TPH contamination. Proposed sample locations are shown in Figure A.2-11.

A.9.11 Use Restriction 12-25-10, Spill H950919A (from UST 12-COMM-1)

During soil removal closure activities related to the 12-COMM-1 waste oil release, a lenticular layer of weathered, gray, hydrocarbon-impacted soil; with different characteristics than the waste-oil-impacted-soil, was identified at 3 ft bgs. This lens of weathered material will be the focus of additional sampling efforts because the UR is based on the visual lateral extent of the weathered material rather than analytical results. Original sidewall samples within this weathered material indicated that TPH contamination ranged from 740 to 1,800 mg/kg at 3 ft bgs; however, subsequent excavation was performed, and it is assumed this contamination was removed. Because excavation was extensive for the 12-COMM-1 release resulting in removal of most TPH contamination related to

the waste oil release, and recreating the sidewall sample locations is not feasible, new locations will focus on the gray, weathered material lens located at approximately 3 ft bgs. Pot-holing up to four locations at the former north, south, east, and west sidewalls with a backhoe will be conducted to visually reidentify the discontinuous lens of weathered hydrocarbon material and collect soil samples for field-screening purposes. Biasing factors will be used to select the most comparable TPH sample for analysis. Expected collection depths are 3 ft bgs based on previous excavation data. One location in the center of the previous excavation will be pot-holed to approximately 9 ft bgs where previous analytical results confirmed TPH (waste oil from 12-COMM-1) was below action levels. If biasing factors indicate the potential for remaining TPH contamination, a sample may be collected for analysis. Proposed sample locations are shown in Figure A.2-12.

A.9.12 Use Restriction 02-02-03, UST 2-300-1

The UST has been removed through excavation and the UR will have one biased sample collected at the subsurface interval near boring B-1, where the highest TPH concentrations (230 mg/kg) were identified and remain at an approximate depth of 15 ft bgs. A new boring will be drilled within a 3-ft radius of B-1, in the direction (south to southwest) of B-3 to an approximate depth of 31 ft bgs, if feasible (i.e., no refusal). Soil samples will be collected at 5-ft intervals and field-screened above and below the anticipated depth of 15 ft bgs. However, the interval with the highest PID field-screening result will be submitted for analysis to achieve a comparable TPH result. Proposed sample locations are shown in Figure A.2-13.

A.9.13 Use Restriction PRL 454, Weathered Diesel Fuel

During sampling, a surface sample (0 to 6 in.) will be collected by hand using a scoop/spade on the western downslope area past the original excavation boundary, if feasible and safe, where biasing factors (i.e., staining) are expected to remain. Up to five soil samples will be initially collected for field-screening purposes with the highest field-screening result submitted for analysis. Although not expected, if biasing factors remain in areas around the concrete pads and original excavation boundary, a sample may be collected between 0.5 to 2 ft bgs. A comparable TPH diesel concentration is not readily available based on the original analytical results. This is because the RL for diesel was 250 mg/kg, and results were less than 250 mg/kg, and the other result was reported as UEH at 3,800 mg/kg. Proposed sample locations are shown in Figure A.2-14.

A.10.0 References

ASTM, see American Society for Testing and Materials.

American Society for Testing and Materials. 1995. *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites,* ASTM E 1739-95 (Reapproved 2002). Philadelphia, PA.

DOE/NV, see U.S. Department of Energy, Nevada Operations Office.

EPA, see U.S. Environmental Protection Agency.

FFACO, see *Federal Facility Agreement and Consent Order.*

Federal Facility Agreement and Consent Order. 1996 (as amended). Agreed to by the State of Nevada; U.S. Department of Energy, Environmental Management; U.S. Department of Defense; and U.S. Department of Energy, Legacy Management.

Lockheed Martin Energy Systems, Inc. 1998. *Environmental Compliance Program, Final UST Remedial Action Report: Phase 2 Offbase Excavate and Remove Sites*. Hazardous Waste Remedial Actions Program. Prepared for the U.S. Department of Energy, Contract DE-AC05-84OR21400. July. Edwards Air Force Base, CA.

Maize, T, Bureau of Federal Facilities. 2004. Letter to J. L. Appenzeller-Wing (NNSA/NSO), entitled, "Approval of Mobility Study Recommendations, Corrective Action Unit 339: Area 12 Fleet Operations, Steam Cleaning Discharge Area, Nevada Test Site, NV, Federal Facility Agreement and Consent Order (FFACO)" 14 April. Las Vegas, NV.

NAC, see *Nevada Administrative Code*.

Nevada Administrative Code. 2006a. NAC 445A.227, "Contamination of Soil: Order by Director for Corrective Action; Factors To Be Considered in Determining Whether Corrective Action Required." Carson City, NV. As accessed at http://www.leg.state.nv.us/nac on 13 December 2007.

Nevada Administrative Code. 2006b. NAC 445A.22705, "Contamination of Soil: Evaluation of Site by Owner or Operator; Review of Evaluation by Division." Carson City, NV. As accessed at http://www.leg.state.nv.us/nac on 13 December 2007.

NNSA/NSO, see U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office.

NNSA/NV, see U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office.

SNJV GIS Systems, see Stoller-Navarro Joint Venture Geographic Information Systems.

Stoller-Navarro Joint Venture Geographic Information Systems. 2007. ESRI ArcGIS Software.

U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office. 2001. *Streamlined Approach for Environmental Restoration Plan for Corrective Action Unit 326: Areas 6 and 27 Release Sites, Nevada Test Site, Nevada*, Rev. 0, DOE/NV--751. September. Las Vegas, NV.

U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office. 2002a. *Closure Report for Corrective Action Unit 326: Areas 6 and 27 release Sites, Nevada Test Site, Nevada*, Rev. 1, DOE/NV--859-Rev 1. December. Las Vegas, NV.

U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office. 2002b. *Industrial Sites Quality Assurance Project Plan, Nevada Test Site, Nevada*, Rev. 3, DOE/NV--372. Las Vegas, NV.

U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office. 2003. *Streamlined Approach for Environmental Restoration Plan for Corrective Action Unit 358: Areas 18, 19, 20 Cellars/Mud Pits, Nevada Test Site, Nevada*, Rev. 1, DOE/NV--837-REV 1. February. Las Vegas, NV.

U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office. 2004a. *NV/YMP Radiological Control Manual*, Rev. 5, DOE/NV/11718-079. Prepared by Bechtel Nevada. Las Vegas, NV.

U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office. 2004b. *Closure Report for Corrective Action Unit 358: Areas 18, 19, 20 Cellars/Mud Pits, Nevada Test Site, Nevada*, Rev. 0, DOE/NV--944. January. Las Vegas, NV.

U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office. 2006. *Industrial Sites Project Establishment of Final Action Levels*, Rev. 0, DOE/NV--1107. Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office. 1992. *Remedial Investigation and Feasibility Study for the Plutonium Contaminated Soils at Nevada Test Site, Nellis Air Force Range and Tonopah Test Range*, April. Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office. 1996. *Corrective Action Investigation Plan: The Second Gas Station Underground Storage Tanks*, Rev. 0, DOE/NV--426. May. Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office. 1997a. *Closure Report for CAU 339: Area 12 Fleet Operations Steam-Cleaning Discharge Area, Nevada Test Site*, Rev. 0, DOE/NV/11718-167. December. Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office. 1997b. *Corrective Action Decision Document, Second Gas Station, Tonopah Test Range, Nevada (Corrective Action Unit No. 403)*, Rev. 0, DOE/NV--471. March. Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office. 1997c. *Corrective Action Plan for CAU 339: Area 12 Fleet Operations Steam Cleaning Discharge Area, Nevada Test Site,* Rev. 0, DOE/NV/11718-106. May. Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office. 1997d. *SAFER Work Plan for CAUs 452,454,456, and 464, Closure of Historical UST Release Sites Nevada Test Site,* Rev. 0, DOE/NV/11718-133. August. Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office. 1998a. *Closure Report for Corrective Action Unit 403: Second Gas Station,Tonopah Test Range, Nevada*, Rev. 0, DOE/NV/11718-207. September. Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office. 1998b. *Streamlined Approach for Environmental Restoration Closure Report for Corrective Action Unit 452: Historical Underground Storage Tank Release Sites, Nevada Test Site, Nevada*, Rev. 0, DOE/NV/11718-209. April. Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office. 1998c. *Streamlined Approach for Environmental Restoration Closure Report for Corrective Action Unit 454: Historical Underground Storage Tank Release Sites, Nevada Test Site, Nevada*, Rev. 0, DOE/NV/11718-211. April. Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office. 1998d. *Streamlined Approach for Environmental Restoration Closure Report for Corrective Action Unit 464: Historical Underground Storage Tank Release Sites, Nevada Test Site, Nevada*, Rev. 0, DOE/NV/11718-212. April. Las Vegas, NV.

U.S. Environmental Protection Agency. 2004. *Region 9 Preliminary Remediation Goals (PRGs)*. As accessed at http://www.epa.gov/region09/waste/sfund/prg/index.htm on 13 December 2007. Prepared by S.J. Smucker. San Francisco, CA.

U.S. Environmental Protection Agency. 2006. *EPA Guidance on Systematic Planning Using the Data Quality Objectives Process,* EPA QA/G-4. Washington, DC.

Appendix B

Project Organization

B.1.0 Project Organization

The NNSA/NSO Federal Sub-Project Director and Task Manager is Kevin Cabble. He can be contacted at (702) 295-5000.

The identification of the project Health and Safety Officer and the Quality Assurance Officer can be found in the appropriate plan. However, personnel are subject to change and it is suggested that the DOE Federal Sub-Project Director be contacted for further information. The Task Manager will be identified in the FFACO Monthly Activity Report before the start of field activities.

Appendix C

Nevada Division of Environmental Protection Comment Responses

(1 Page)

NEVADA ENVIRONMENTAL RESTORATION PROJECT

DOCUMENT REVIEW SHEET

1. Document Title/Number: Draft Draft Supplemental Investigation Plan for Federal Facility Agreement and Consent Order Use Restrictions, Nevada Test Site, Nevada, Revision 0, December 2007	**2. Document Date:** 01/17/2008
3. Revision Number: 0	**4. Originator/Organization:** Stoller-Navarro
5. Responsible NNSA/NV ERP Project Manager: Kevin J. Cabble	**6. Date Comments Due:** 01/17/2008
7. Review Criteria: Full	
8. Reviewer/Organization/Phone No: Don Elle and Jeff MacDougall, NDEP, 486-2850	**9. Reviewer's Signature:**

10. Comment Number/Location	11. Type*	12. Comment	13. Comment Response	14. Accept
1.)		NDEP reviewed the Draft Supplemental Investigation Plan for Federal Facility Agreement and Consent Order Use Restrictions, Nevada Test Site, Nevada document and had no comments on this document.	N/A	

Library Distribution List

	Copies
U.S. Department of Energy National Nuclear Security Administration Nevada Site Office Technical Library P.O. Box 98518, M/S 505 Las Vegas, NV 89193-8518	1 (Uncontrolled, electronic copy)
U.S. Department of Energy Office of Scientific and Technical Information P.O. Box 62 Oak Ridge, TN 37831-0062	1 (Uncontrolled, electronic copy)
Southern Nevada Public Reading Facility c/o Nuclear Testing Archive P.O. Box 98521, M/S 400 Las Vegas, NV 89193-8521	2 (Uncontrolled, electronic copies)
Manager, Northern Nevada FFACO Public Reading Facility c/o Nevada State Library & Archives 100 N Stewart Street Carson City, NV 89701-4285	1 (Uncontrolled, electronic copy)